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BLACKWATER FEVER IN THE TROPICAL AFRICAN DEPENDENCIES.

REPORTS FOR 1912.

(For previous Reports see [Cd. 6514], December, 1912.)

Presented to both Houses of Parliament by Command of His Majesty.
January, 1914.



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M A P S.

- I. Spot map of Sierra Leone, shewing where cases occurred in 1912.
- II. „ Northern and Southern Nigeria, shewing where cases occurred in 1906-1912.
- III. „ Uganda, shewing where cases occurred in 1912.
- IV. „ Nyasaland, shewing where cases occurred in 1912.
- V. „ East Africa Protectorate, shewing where cases occurred in 1912.
- VI. „ Gold Coast, shewing where cases occurred in 1912.



BLACKWATER FEVER IN THE TROPICAL AFRICAN DEPENDENCIES.

REPORTS FOR 1912.

Early in 1911 the following despatch was sent by the Secretary of State to the Governors of all the British dependencies in East and West Africa, with the exception of Somaliland :—

SIR, Downing Street, 24 January, 1911.

It has been suggested by the Advisory Medical and Sanitary Committee for Tropical Africa—and I entirely concur in the suggestion—that, owing to the prevalence of blackwater fever in the Dependencies of Tropical Africa, it is desirable to collect all information bearing on this disease in order to throw as much light as possible on its nature and causation.

2. The opinions of medical authorities are divided as to whether the disease is directly related to malaria or whether it is a separate disease which is produced by a specific organism, not yet recognised, and which is possibly contracted in particular localities or buildings under certain conditions.

3. At present the conditions favouring the incidence of blackwater fever are not thoroughly understood ; and it is possible that, by the collation and careful study of all cases which occur, some light may be thrown on this important subject and means suggested to prevent or diminish its occurrence.

4. With this object, therefore, I have to request that a special report may be forwarded annually by the Principal Medical Officer on all cases of blackwater fever occurring within the year in the Colony, attention being particularly paid in the report to the following points :—

I. *Locality :*

- (a) Physical features (*e.g.*, swamps, bush, forest, &c.).
- (b) Occurrence of a series of cases in any one place, particularly in any one building, specifying dates and relation to native dwellings and intercourse.
- (c) Insect fauna : particularly biting or sucking insects, such as mosquitos and biting flies, ticks, bugs, lice, fleas, &c. Specimens should be obtained and identified where possible.

II. *Seasonal Variation :*

- (a) Marked or unusual climatic conditions.

III. *Personal History :*

- (a) Medical history of patient (*e.g.*, previous diseases, attacks of malaria, habits regarding quinine taking, &c.).
- (b) Previous movements of patient and personal conditions to which he has been subject.
- (c) Microscopic examination of the blood (noting relation of examination to stage of illness).

5. It would be a great advantage if a map could be supplied with the report, showing the occurrence of cases in the various localities.

I have, &c.,
L. HARCOURT.

The replies were published [Cd. 6514] and presented to both Houses of Parliament. The report from Southern Nigeria was not included in the above Command paper, but was published separately.

The present paper contains the reports on blackwater fever for the year 1912, except that in the case of Nyasaland the report is for the year 1911-1912, to the end of March of the latter year.

It has been necessary to collate the several reports in order to secure as great a degree of uniformity as possible.

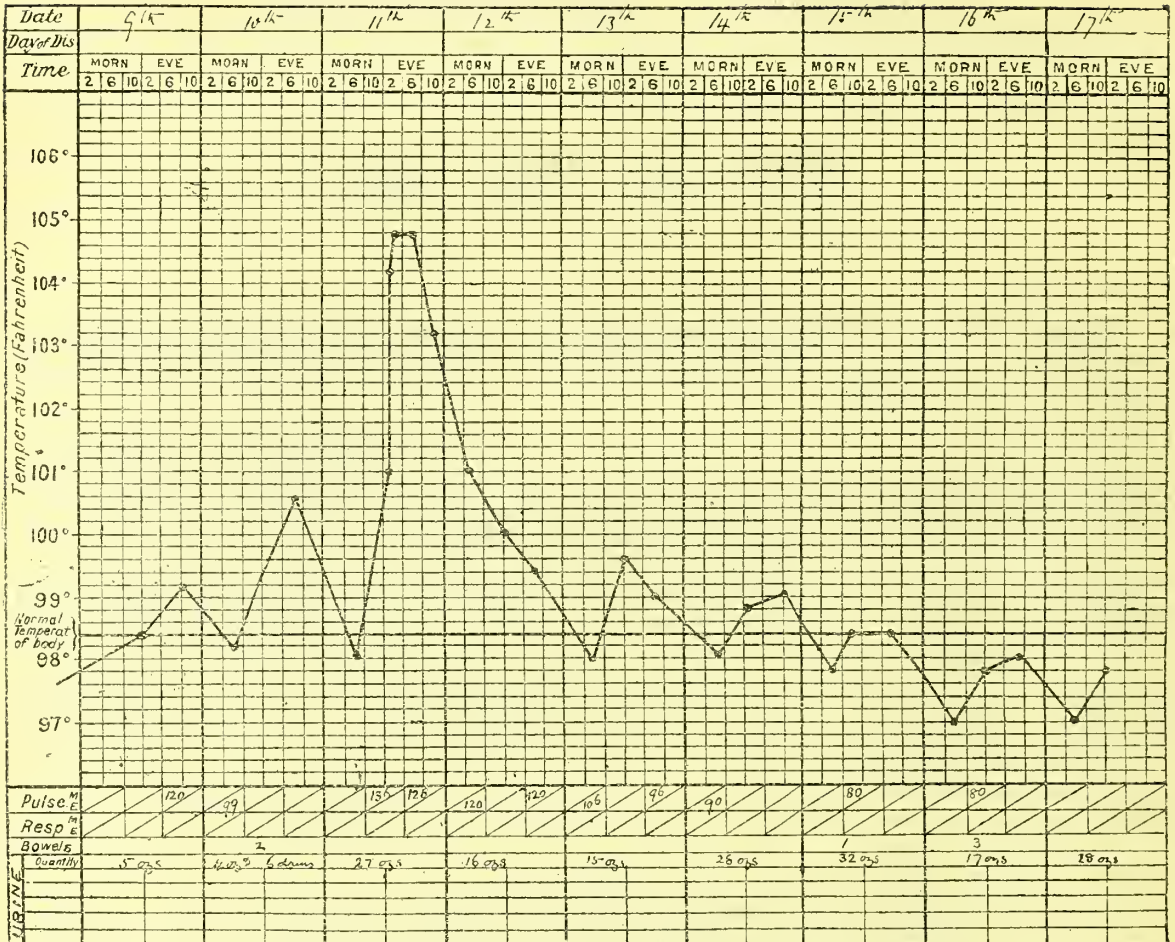
GAMBIA. BATHURST.

CASE 1.

A Syrian trader, aged about 60.

Previous history.—This was unobtainable.

April



History of present illness.—On April 9th he was admitted to hospital, his friends saying that he had been suffering from blackwater fever. On admission, the temperature was 98.4° and the pulse rate 123. The urine was clear and did not contain albumen. He was given calomel grs. 5, and magnesium sulphate ̄i was ordered for the following morning.

He had a good night.

On April 10th the morning temperature was 100.6°. At 10 p.m., as the bowels had not been moved, he was given *Oleum Ricini* ̄i; two motions resulted.

On April 11th, at 6.30 a.m., the temperature was 98.4°. Quinine grs. 5 was given. At 9.45 a.m. he had a rigor, for which he was treated in the usual way. He now became very restless and complained of great pain over his kidneys. He vomited some greenish fluid. At 10.50 a.m. he passed six ounces of urine quite black in colour. The temperature rose to 104.8°. He was given large quantities of barley water—50 ounces in twelve hours—which he retained. There was no more vomiting during the day. The pulse rate was 136.

On April 12th there were symptoms of suppression. Only one ounce of urine had been passed between 2 p.m. on the previous day and 7.30 a.m. The morning temperature was 101°, the pulse rate 120. Barley water, hot milk, and small quantities of brandy were given by the mouth. The total quantity of fluids retained between 7 a.m. and 6 p.m. was 63 ounces. At 3 p.m. the colour of the urine began to improve. The evening temperature was 99.4°, the pulse rate 120.

On April 13th the morning temperature was 98°. The yellow colour of skin and conjunctivæ, which had been slight, was now fading. At 9.30 a.m. he passed

fifteen ounces of urine of normal colour. At 6 p.m. the temperature was 99°. He again passed fifteen ounces of urine at this time.

From now on recovery was uneventful. No more quinine was given. The spleen was only very slightly enlarged. The liver was normal in size. A blood examination after the attack failed to show malaria parasites.

On April 17th the patient was discharged cured.

This was the only case of blackwater fever that occurred in Bathurst during the year.

BOARD SHIP.

CASE 2.

Steward on board a mail steamer, aged 36.

Previous history.—He had made ten voyages on the West Coast of Africa during three-and-a-half years, but had never resided there. He stated that he did not have an attack of fever until about a year before the “present illness,” when he first began to take quinine. Six months before his “present illness” he suffered very much from fever, being ill almost continually for six weeks. For eighteen days before leaving Liverpool he took quinine grs. 5 every second day, and during the voyage he took quinine grs. 5 every day.

History of present illness.—June 7th: He was quite well for the whole of the present voyage until the night before his ship arrived at Bathurst from Liverpool, when he felt a little “seedy,” but not ill enough to be off work.

On June 8th, at 3 a.m., he passed black urine, and later his skin became very yellow. On admission to hospital he was very weak and bloodless. The skin and conjunctivæ were tinted a deep yellow colour. The urine was quite black, and the passing of it caused great pain. The spleen could be just felt. Liver and heart were normal. The bowels were freely opened, and fluids only—barley water, soda water, and milk—were given by the mouth in as large quantities as he could take. A blood examination during the acute stage did not show malaria parasites. Within twenty-four hours the urine began to clear up. The patient had no dangerous symptoms during the attack.

June 9th: In the evening the urine was clear.

Recovery was uneventful. He was given a mixture containing *ferri et ammonii citratis*, grs. 5, and *liquor arsenii hydrochloricus*, m 5, during his convalescence. He left hospital for England in poor health, being very anæmic. No quinine was given during his illness.

(See chart facing page 8.)

MACCARTHY ISLAND.

CASE 3.

Clerk (aged 28) of French nationality, employed by a trading company; arrived at Bathurst from MacCarthy Island suffering from blackwater fever.

1. *Locality.*—

(a) *Physical features.*—MacCarthy Island is situated about one hundred and fifty miles from Bathurst, and is about three miles long by one broad.

The middle of the island consists of swamp, on the borders of which the town is built.

The trading firms occupy the frontage on the river and live in stone or wooden houses.

The natives plant ground-nuts and rice where possible, and the rest of the island is swamp and bush.

(b) *Occurrence of a series of cases in any one place.*—No record.

(c) *Insect fauna.*—The usual species of mosquito and biting flies and sucking flies found in Bathurst are also found in MacCarthy Island.

Specimens have already been sent home and identified.

2. *Seasonal variation.*—

The climate was such as usually obtains at this time of the year in MacCarthy Island—cold at night and early morning, hot in the mid-day.

3. *Personal history. Medical history.*—

The patient did not recollect having had a serious illness prior to this attack.

He had had one or two slight attacks of fever, and he had not been in the habit of taking quinine. Occasionally he had taken it when feeling run down.

(b) *Previous movements and personal conditions.*—He had been seven years in the Colony of the Gambia and one year in Dakar, with intervals of leave in France. The greater part of this time he spent in MacCarthy Island, where he was when he contracted this attack of blackwater fever. This tour he had spent twelve months between Bathurst and MacCarthy Island. He lived under the same conditions as in Bathurst, that is, he had mosquito-proof shelters, and good food and water. He was probably more exposed to the sun than he would have been in Bathurst, owing to the nature of his work.

(c) *Microscopic examination of the blood.*—The blood was examined on the fourth day of his illness, when there was hæmoglobinuria present and a temperature of 102°; no malaria parasites were found. It was also examined when the urine had cleared, with the same result.

History of present illness.—

Dec. 13th: He stated that he had been ill for two days before, and had not been fit for a fortnight. He was removed to hospital at once, and put to bed. His temperature was 101·8°, pulse 108, respiration 26. He passed 14 ozs. of urine, quite black; his bowels had not been moved for some time; he was given *mist. alba*, ozs. 2, and he passed two motions, which were bilious in character: Sternberg's mixture was given every two hours, as were also milk and barley water. He complained of tenderness over the bladder, and was very restless.

On Dec. 14th his temperature rose to 103·4°, and he complained of headache; he asked for iced champagne, which was given him, and a teaspoonful of brandy in milk was given occasionally. His blood was examined; no malaria parasites were found; his urine also was examined and found to be albuminous. At noon, he passed sixteen ounces of urine, which was beginning to clear, and at 6.30 another sixteen ounces, which was almost clear. During the afternoon he was very restless, and delirious at times; at 9.30 he was very weak, and at 10.15 he was given a hypodermic injection of strychnine. The Sternberg mixture was stopped, and *mist. pot. acet.* ordered, but the patient refused to take it. He was given iced barley-water with a little brandy every quarter of an hour through the night, which was retained. He was restless and wandering, and passed his water unconsciously. Temperature 103·3°, pulse 144, at 12 midnight.

He had a very bad night, and had no sleep. He passed water a second time unconsciously towards the morning.

Dec. 15th: He was very weak all day, but kept all his nourishment down; his urine was quite clear and abundant.

Dec. 16th: His medicine was changed to a mixture of *ferri et ammon.-cit.* and glycerine, which he took very well. He complained of headache, and, as his bowels had not been moved, he was given calomel, grs. 2, phenacetin, grs. 5. He was still restless and delirious during the night, and passed his water unconsciously. After midnight he slept for three or four hours, but was again restless when he woke.

He took his nourishment all the time very well, and retained everything he was given.

Dec. 17th: Although still very weak and in a critical condition, the patient seemed to have got over the worst of the attack. He took his nourishment very well and slept fairly well. His temperature still kept up, but otherwise the patient seemed better. The urine was still abundant and clear and contained no albumen.

Dec. 18th: The temperature dropped to 99·6°, and there was a considerable improvement in his condition. The temperature rose again in the afternoon to 101°.

Dec. 19th: From now onwards the patient continued to improve, the temperature gradually dropping to normal with slight accessions. There were no complications and he was discharged from hospital on the 31st December—the twenty-first day of his illness.

- This was a typical blackwater fever case, and the most critical period was the day or two following the clearing of the urine, which occurred on the fourth day of the disease.

J. C. FRANKLIN.

December 1912

CASE 3

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SIERRA LEONE.

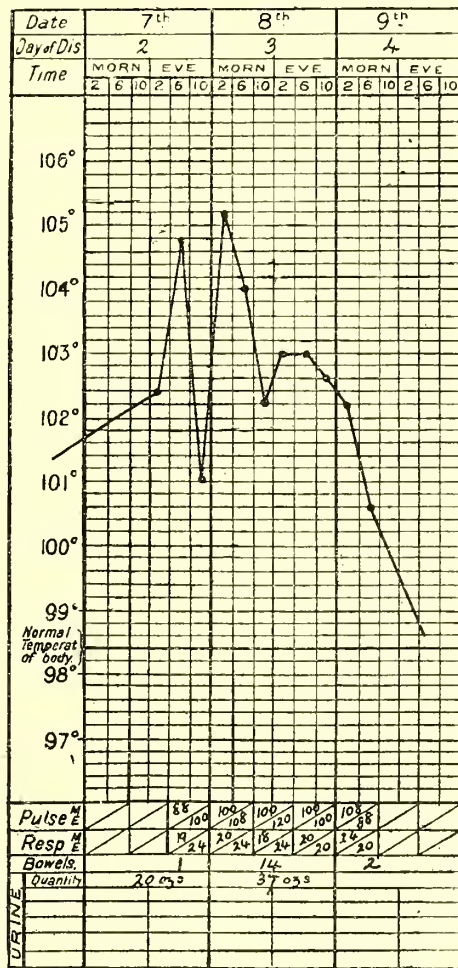
MOBE.

CASE 4.

A missionary, aged 27.

Previous history.—He had spent seven months on the West Coast of Africa, during which time he had repeatedly suffered from "small fever." He stated that he had taken quinine regularly, but this was doubtful.

July



History of present illness.—On July 7th he did not feel well. The urine was scanty, but clear.

On July 8th it was noticed in the early morning that the urine was dark. There was severe pain in the back and arms and the patient had a very severe and prolonged rigor. He was placed on board a boat and taken to Bonthe—a journey of about 4½ hours—and admitted to hospital.

On examination the skin was of a citron yellow colour; the temperature 101.4°; the pulse, 88 beats to the minute, was of fair volume. The patient was very weak, restless and sweating profusely. There was no vomiting. Blood films showed no malaria parasites. At about 7 p.m. he passed seven ounces of a very dark and somewhat viscid urine. At 9.30 p.m. he again passed somewhat clearer urine, making up the total quantity of urine for the day to 20 ounces. He vomited bilious matter twice. The temperature was 104°, the pulse rate 108.

On July 9th the patient was not so well. There was no vomiting, but he was very weak and the urine was not being secreted in sufficient quantity. At 7 a.m. the quantity passed in the previous twenty-four hours was 37 ounces. The temperature was 103°, the pulse-rate 120. The heart sounds were clear but weak. At 2.30 p.m. he was in a collapsed condition; the temperature was 99°; the pupils were dilated; the skin was cold; the respiration sighing; the bladder empty. He vomited twice. At 2.45 p.m. unconsciousness supervened. Death occurred at 3 p.m.

The patient was treated with Sternberg's mixture. Saline enemata were given;

milk, and milk and Vichy water, were given by the mouth. Poultices were applied to the back, and strychnine and digitalis were given hypodermically. He, however, never made any attempt to fight the disease, but was content to remain lying down, taking what was offered him, apparently not having the wish to live.

R. W. ORPEN.

BONTHE.

CASE 5.

A man of Swiss nationality, aged 24, residing at Bonthe.

Previous history.—He had spent two years in West Africa, during which time he had had one or two attacks of fever and some “small fevers.”

History of present illness.—On September 24th, at noon, the patient took 18 grains of quinine in one dose. He suffered from rigors during the day and did not receive medical attention until 5 p.m., when the temperature was 104° , the pulse rate 112, and he was sweating profusely. The urine was quite clear. The spleen was felt easily. At 10 p.m. quinine, grs. 5, was given.

He slept well during the night.

On September 25th the morning temperature was normal, he felt fairly well, but was very anæmic, and a pale icteric tinge was noticed in the conjunctivæ. The administration of quinine was stopped and arsenic and iron were given.

On September 26th, at 8 a.m., the medical attendant was sent for. The patient was now suffering from blackwater fever. His temperature was 100.8° and he had a very severe rigor. The skin was of a brilliant citron yellow colour. He vomited bilious matter twice during the day. The urine was very dark—like stout; the total amount passed during the day was 34 ounces.

September 27th: In the morning the urine was darker than on the previous day. He was restless and felt very weak, but there was no vomiting. A systolic bruit could be heard in the mitral area. He slept a little during the day. The urine passed during the day measured 40 ounces.

On September 28th he passed a fair day. He was restless at times. There was some pain on passing urine. The systolic murmur could still be heard distinctly in the mitral area, the heart's first sound being somewhat short and sharp in character. Stimulants were given in increased quantity. The total urine passed during the day was 41 ounces.

He passed a fair night, sleeping for $4\frac{1}{2}$ hours.

On September 29th the urine showed signs of clearing, and there was less difficulty in passing it. There were no rigors nor vomiting; he took his nourishment well. The total amount of urine passed was 42 ounces.

He slept six hours during the night.

On September 30th he was better. The urine was clearing. The icteric tinge was not so pronounced and the patient felt stronger. There was a rise of temperature in the evening caused by the excessive amount of stimulant given.

October 1st: From this date the patient steadily improved. The urine gradually cleared, the patient gained in strength, and the cardiac murmur slowly decreased in volume.

On October 8th he was convalescent and was rapidly recovering strength, but was still very anæmic.

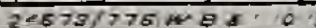
The patient remained well until October 18th, when the temperature rose to 102.4° accompanied by a rigor. He was put to bed. The blood showed, on examination, numerous malaria parasites. Quinine was given in small doses, the temperature fell and, after another rise on October 20th to 102° , again fell to normal, where it remained.

The treatment adopted during the attack of blackwater fever was by Sternberg's mixture and by saline enemata. Milk, Vichy water, Brand's essence, brandy and champagne were given.

The point of interest was the non-discovery of parasites in the blood at the time of the first attack and their presence during the second attack.

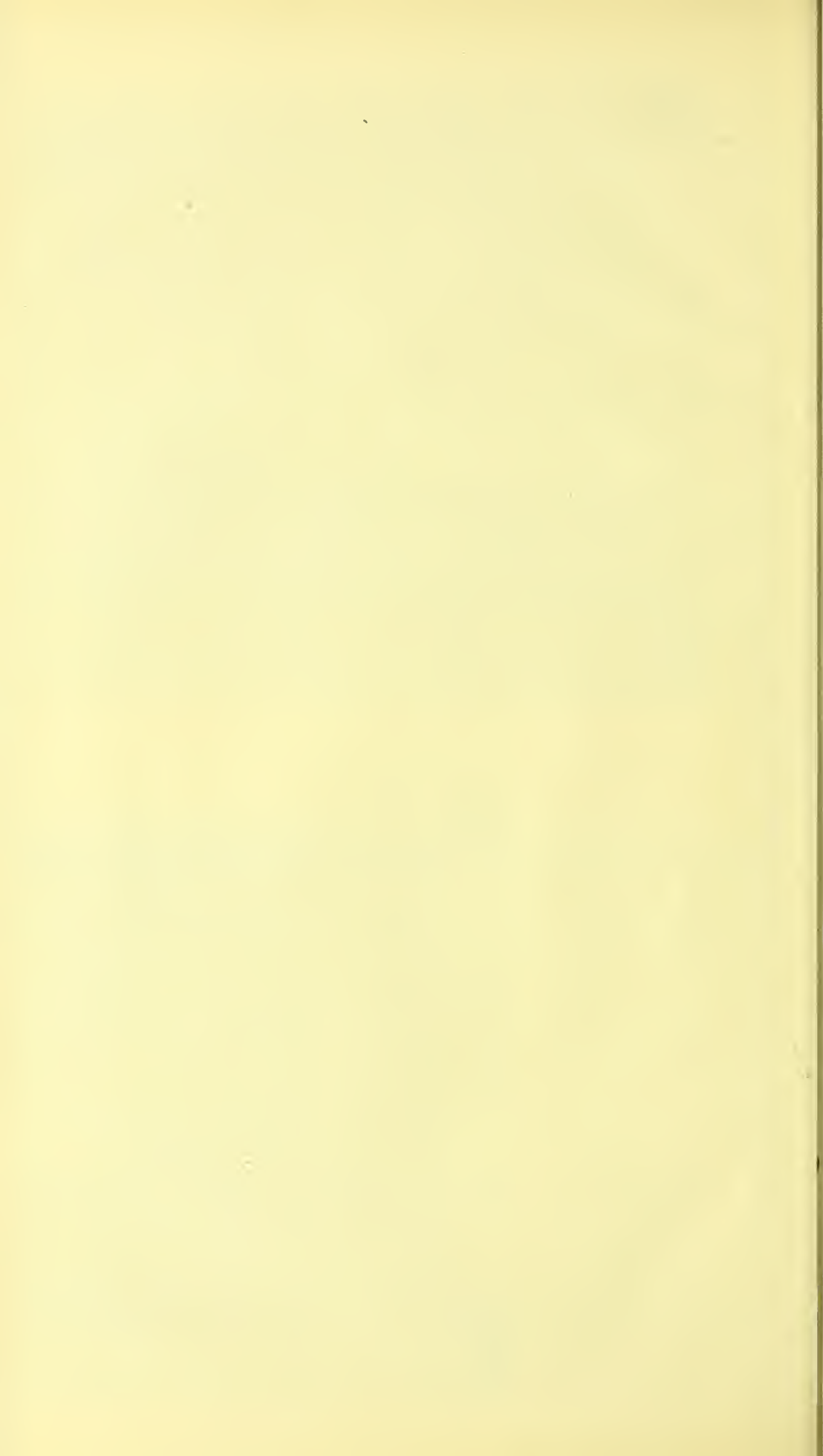
The attack was a severe one, the rigors were very much prolonged and severe, and the condition of the heart caused some anxiety for days.

R. W. ORPEN.

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Date	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
Day/Notes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27		
Time	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	MORN	EVE	
Temperature (Fahrenheit)	103.5	104.2	98.5	99.5	100.5	99.5	99.0	100.0	99.5	99.0	99.5	99.0	99.5	99.0	99.5	99.0	99.5	99.0	99.5	99.0	99.5	99.0	99.5	99.0	99.5	99.0	99.5	99.0	
Pulse			80	80	76	78	80	90	90	80	72	72	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
Respiration			18	18	18	18	17	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	
Bowel Movements																													
Urine			340 cc		40 cc		41 cc		42 cc		46 cc		56 cc		67 cc		70 cc		68 cc		57 cc		32 cc		56 cc		46 cc		





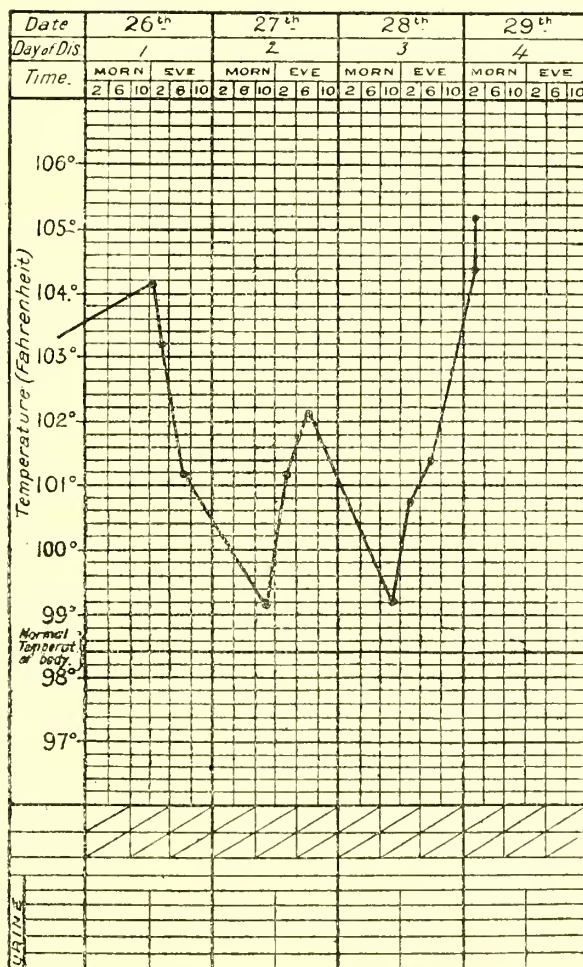
FREETOWN (MOYAMBA).

CASE 6.

A lady missionary, aged 32.

Precious history.—She arrived in the Colony for the first time in 1899 and lived in Freetown without a break until 1907. During this time she maintained fairly good health, but suffered at times from slight attacks of malarial fever. In 1907 she had her first attack of blackwater fever, after which she was invalided to England, where she remained for over six months. In 1908 she returned to the Colony and lived at Ascension town, about two miles from Central Freetown. In 1910 she commenced to show signs of weariness, due, undoubtedly, to constant teaching. She took quinine irregularly. Her condition not being on the whole satisfactory she was advised again to take a holiday in Europe, but refused. She continued her duties as usual till 1911. Towards the latter end of this year she suffered now and again from bilious attacks which she called “sick stomach.” She was unable to eat much, all her efforts to work being done under the determination not to yield to sickness. At Christmas time she visited Moyamba, where she stayed for three weeks, living in the vicinity of the native town. She returned to Freetown, as she said, rested and better, on January 24th.

January



History of present illness.—On January 26th she went for a short walk in the morning, returning home between 8 and 9 a.m. At 10 a.m. she had a little fever, but did not take to bed till about 1 p.m., when she had a slight rigor and noticed that her urine was black. The temperature was now 104°, and medical advice was sent for. At 2.30 p.m. the temperature was 103°; she had taken phenacetin and caffeine and was perspiring. At 7 p.m. the temperature was 101°. She was cheerful. There was no vomiting. She was perspiring and the urine was still black in colour.

On January 27th, at 9 a.m., the temperature was 99°. The skin was acting freely. The bowels had been opened. There was no vomiting. There was no pain over the regions of the liver, stomach or spleen. The urine was plentiful and of

lighter colour. At 2 p.m. the temperature was 101°. The skin was not now acting so freely. She was fairly comfortable. The urine was still being passed in fair quantity and its colour continued to improve. At 6 p.m. the temperature was 102°. She was perspiring and complained of headache. After the bowels had acted, however, she again felt more comfortable. The blood was examined microscopically—no malaria parasites were found.

During the night she slept badly, and felt quite weak and tired in the morning.

January 28th, at 9.30 a.m., the temperature was 99.0°. She was taking her nourishment fairly well. The urine still continued to clear up: there was little sediment in it. At 6 p.m. the temperature was 101°. She had slept at times during the day and felt the better for it.

At 1 a.m. on the morning of January 29th she had a severe rigor. The temperature rose to 105°. At 2.15 a.m. the temperature was 104°. The skin was hot and dry, and she was said to have had a slight convulsion. She was now semi-comatose; the coma deepened till she died, early in the morning.

Remarks.

The officer reporting this case makes the following remarks:—

"I do not believe that blackwater fever is related in any way to malaria fever. It is a disease due probably to some parasite or toxin in the blood. Europeans are more predisposed to it than the natives of this Colony, and such of the natives that have suffered from it are, in my experience, among the better-class natives, who live on a mixed European and native diet or on a solely European diet. By European diet I mean meat, pastry, and other highly seasoned food. Alcoholism is not a predisposing cause. Lowered vitality predisposes to it. I cannot say it is a disease of any particular locality, as it attacks Europeans whether resident in the hills or among the valleys.

"Ascension town, where this patient lived, is built on a plateau about 80 feet above sea level, at the foot of a range of hills coming from the southern end of the peninsula. The plateau is of a rocky foundation, consisting of laterite and granite, distant about two miles from Freetown, from which it is separated by the Alligator river. This river during the rainy season contains a large volume of water, but in the dry season it becomes an extremely narrow stream running slowly in a narrow channel which broadens in places. Large boulders interrupt its flow and form breeding grounds for mosquitoes. On the south of the plateau is the Congo Town River which separates it from Congo Town, while to the north lies the Congo Town Creek. The hamlet is inhabited by a few fishermen, who live with their families in bamboo-thatched cottages along the road leading to Freetown. Mosquitos are plentiful, as are the *Glossina palpalis* and *morsitans*.

"Blackwater fever occurs at all seasons of the year."

Two other cases of blackwater fever occurred in the Colony* during the year: one at Blama on the railway. He was a missionary, aged 33 years, who had been in the Protectorate for over four years. This patient died without medical assistance. The other case was attended by a private practitioner not in Government service, who did not furnish a report on the case. This latter case was a patient who was an old "coaster," having put in at least ten years' service in the Colony. He recovered and went home.

BATKANU.

CASE 7.

Government official, aged 52, who lived at Batkanu.

Previous history.—He had completed 13 years' service. During that time he had had several attacks of malarial fever. During his last tour's service (1912) he had kept good health. He did not take quinine regularly. He was very temperate

* As opposed to the Protectorate, where the next case (Case 7) occurred.

in his habits and took no intoxicants at all for the two months immediately preceding his illness.

November



History of present illness.—For a week before his illness the patient complained of and was treated for constipation. He was somewhat worried and upset about his work.

On the morning of November 9th, while at work in his office, he complained to his medical adviser of headache. At 4 p.m. on the same day he sent for medical attention. His temperature was now 100.4°. An examination of the blood failed to reveal malaria parasites. He said that he had been taking quinine, grs. 20, for the past four or five days. At 11 p.m. bilious vomiting occurred and a definite rigor was noticed. Both liver and spleen were enlarged.

November 10th: At 10 a.m. the temperature was 103.6°—the maximum for the day. Vomiting occurred spasmodically during the day. He complained of thirst, nausea and pains in the back. Three dark liquid motions were passed. The urine was quite clear but contained a trace of albumen.

November 11th: At 11 a.m. the temperature began to rise, until at 2 p.m. it reached 104°—the maximum during the illness. Simultaneously with this rise in temperature, hæmoglobin appeared in the urine and was present for the rest of the day. The blood was again examined, but no malaria parasites were found. The pulse, small, regular, and compressible, was about 86 beats to the minute. A large quantity of urine was passed, but with considerable straining. Frequent motions, containing both bile and hæmoglobin, were passed.

November 12th: At 2 a.m. there was profuse perspiration and with it the hæmoglobinuria gradually disappeared. Rigors were frequent—every 20 minutes. Vomiting and diarrhoea were most persistent. No food or medicine could now be retained. The urine, of which 29 ounces were passed, contained about half its bulk of albumen.

Nov., 13th: Exhaustion was marked and the pulse and heart grew gradually weaker. There were delirium and unconsciousness. The temperature remained between 101.6° and 103.8°; the highest temperature recorded was at 6 p.m. 57 ounces of urine were passed during the day.

Nov. 14th : Signs of heart failure now showed themselves associated with the distressing symptoms of the previous day. The pulse became very rapid and irregular and the first sound of the heart became inaudible. Only six ounces of urine were passed during the day. At 3 p.m. a convulsion set in, during which the patient died from heart failure. A slight return of the hæmoglobinuria was noticed about two or three hours before death, and the vomit and fæces also contained hæmoglobin at the same time.

Remarks.

I. *Locality.* (a) *Physical features.*—Batkanu is well situated on a hill about 700 feet above sea level. There are no forests near by, but the station is surrounded by fields of long elephant grass. The River Mambolo lies about 300 yards away to the north, and on the east, a large swamp stretches for about a mile towards the same river. On the south, again, is low swampy ground. On the west the country is low and undulating, but not swampy.

(b) *The occurrence of a series of cases in one place.*—No other cases of black-water fever have been known to have occurred here. The station quarters for European officials are rather near the native village and the barracks for the native messengers. The village is only 500 yards distant and the barracks are still nearer.

(c) *Insect fauna.*—A few specimens of *Stegomyia fasciata* have been noticed, but mosquitoes are not plentiful here during the dry season, and most of them are of the genus *Culex*. A few tsetse flies, *Glossina morsitans*, are to be found at the river near by; specimens of these will be sent home for identification.

II. *Seasonal variation.*—The previous rainy season had not been an exceptionally heavy one. The rains were nearly over in the middle of November, when the case occurred. A slight harmattan was blowing; it was very hot in the day time, but the nights were cold.

W. C. E. B.

TABLE OF INFORMATION UNDER CERTAIN HEADS REGARDING CASES OF BLACKWATER FEVER OCCURRING IN SIERRA LEONE DURING 1912.

Name.	Age.	Race.	Occupation.	Locality.			Seasonal Variation, marked Climatic conditions, &c.	Personal History.				Where case occurred.
				(a) Physical Features, Swamp, &c.	(b) Multiplicity of cases in same place, house, &c.	(c) Insect Fauna.		(a) Previous Illness.	(b) Quinine Prophylaxis.	(c) Previous Movements.	(d) Blood Examination.	
Case 4. (Fatal.)	27	European	Missionary	Near a river, swampy.	No other cases reported.	Mosquitoes and sand flies.	Similar to Case 7.	Repeated small attacks of fever during past seven months.	Patient stated he had taken quinine regularly.	Only nine months in West Africa.	Not examined.	Only seen by Medical Officer in last stage. In Protectorate. (Dr. Orpen's case.)
Case 5. (Recovered.)	24	Swiss	Trader	Low-lying, swampy mangrove creeks.	Occasional cases in the locality.	Sand flies, Stegomyia, Culex, and Anopheles, also tsetse flies.	Humid, heavy rainy season, June to September.	Malarial fever attacks.	Not stated.	Two years' residence in West Africa.	No parasites at early stage, but found during convalescence.	In Bonthe, Sherbro river. (Dr. Orpen's case.)
Case 6. (Fatal.)	32	European	Missionary	Two mountain streams at each side of house, about 1,000 yards away. January is a dry season month, when there is no swampy land near. It is level grass land, dry and burnt up in dry season, but water-logged and full of pools in rains. Formation — rocky, chiefly laterite and syenite.	Occasional cases occur in Freetown and neighbourhood, but not in any one locality more than another.	Stegomyia and Anopheles, also Glossina, are found at different times of the year.	The harmattan season, from January on and off until end of February, is cool at night and morning time.	Mild attacks of malarial fever occasionally, one previous attack of black-water fever.	Irregular.	Lived in Freetown and its neighbourhood from 1899, with short intervals of absence in Europe.	No parasites.	Case occurred at Freetown (Dr. Renner's case.)
Case 7. (Fatal.)	52	English	Government Official.	High land, about 300 yards from river; low-lying plains and swampy areas in the neighbourhood some 100 to 500 yards away.	No other cases recorded.	Stegomyia, Culex, Culicoides, and tsetse flies.	The previous rains were not excessive, they were nearly over when the case occurred. A slight harmattan was on at the time; nights cool, days hot.	Had suffered from several attacks of malarial fever.	Irregular.	An old resident in the Colony, 13 years; had been on patrol a week previous to onset of attack.	No parasites found.	At Bateman, Karamore district, Protectorate. (Dr. Bower's case.)

R. M. FORDE,
Principal Medical Officer.

20th February, 1913.

NORTHERN NIGERIA.

The Acting Principal Medical Officer, in forwarding the report on "Blackwater fever in Northern Nigeria for the year 1912," states :—

"Of the fourteen cases recorded in the accompanying charts, I am able to forward particulars, as called for in the Secretary of State's despatch, No. 34/1911, of twelve such cases. Particulars of one of the remaining cases—an attack of blackwater fever of a very mild type, resulting in an uninterrupted recovery—could not be obtained, owing to the subsequent immediate departure from the Protectorate of both the patient and his medical attendant. The other was a fatal case, in a trader of Portuguese extraction, who, although his death was the obvious result of an attack of blackwater fever, could not be reached before death by a medical officer. The deceased had been for some years continuously resident in the country, and his mode of life was, as far as can be ascertained, entirely unsuitable for a European subject in tropical Africa.

"As regards the twelve cases of which details are given, the points which would appear to call for comment are closely akin to those mentioned in the report for the year 1911, and are briefly :—

- (a) Residence in native-built mud houses of eight of the persons affected.
- (b) In nine cases, out of the twelve reported upon, the patients were irregular in their habits regarding quinine taking.
- (c) Negative results of the microscopic examination of blood, which were carried out whenever possible.
- (d) Although not actually stated in the majority of the cases, I gather that the persons affected were subject to much exposure to sun and rain.

"The mud houses of native build, (a) above, were fully described by Dr. Manning in his report for 1911. In many instances, housing of this nature is, for the present, the only possible one, and I would add that properly constructed mud houses are cool and fairly comfortable, and I cannot think that residence therein is to be regarded as generally inducive to conditions favouring attacks of hæmoglobinuric fever. This opinion is supported by the fact that there are many officers of long service in the Protectorate who have been for several years compelled to live in native-built houses, and whose record of health shows a complete immunity from blackwater fever.

"Nine of the cases recorded, and at least one of the two unrecorded, occurred in men who were neglectful or irregular quinine takers. This fact enhances Dr. Manning's remarks in his last report, and, I consider, strongly supports the probability of previous malarial infection being a predisposition of blackwater. In a clinical report received on one of the cases under reference—a man of most irregular habits in the use of quinine—the medical officer in charge wrote as follows :—

'It would appear that the cause of hæmoglobinuric fever in this case was, in the main, brought about by the injudicious taking of quinine in large doses, as the patient took grs. 25 *in one dose*, the views of Koch, Christophers, and Stephens on this point being apparently upheld as to hæmoglobinuric or blackwater fever being due to quinine poisoning.'

"Microscopic examination of blood, made in every possible case, revealed nothing worthy of note.

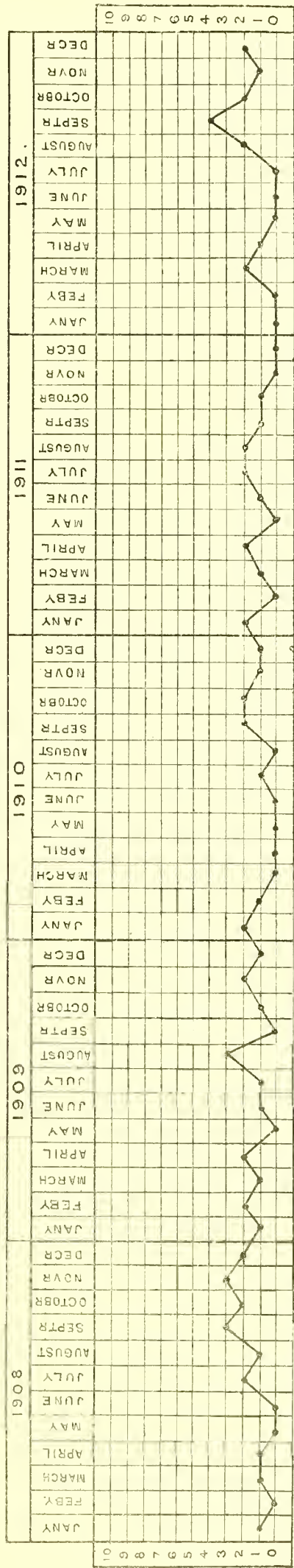
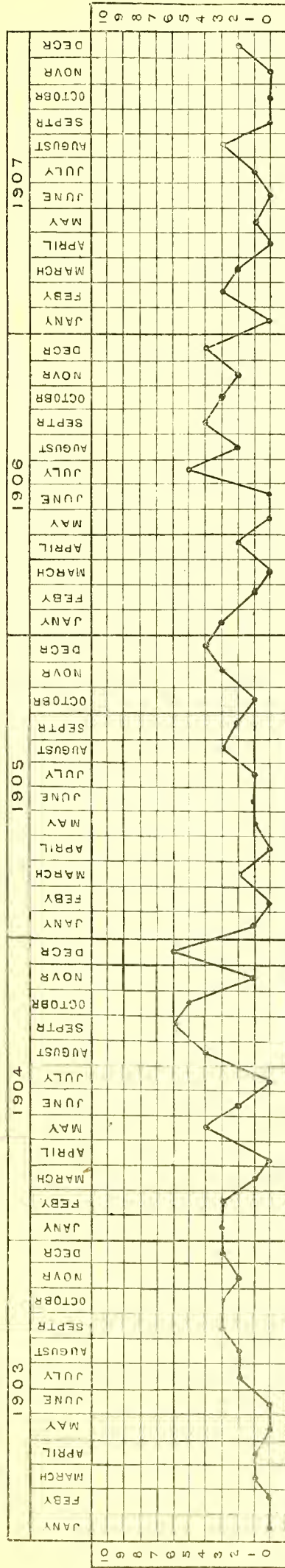
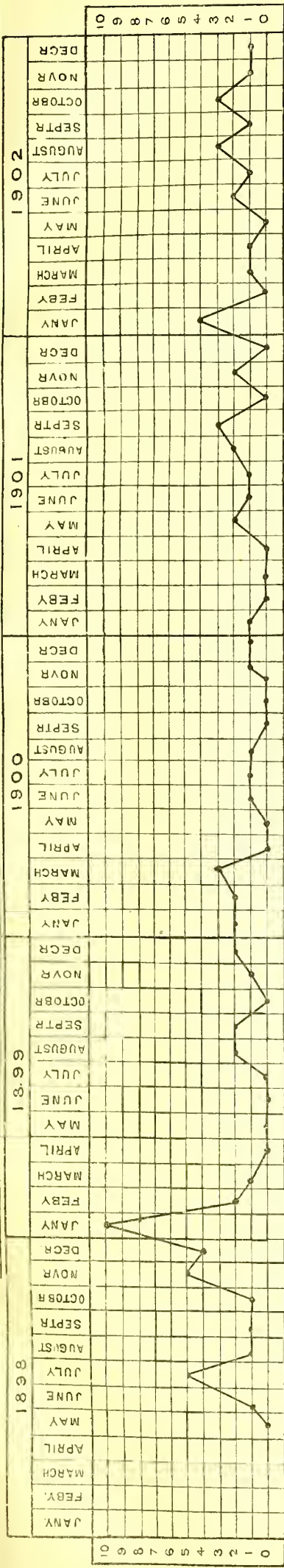
"Undue exposure to the tropical sun can, I consider, only be regarded as indirectly predisposing to hæmoglobinuria in that its weakening effect on the physical condition renders the person so exposed more liable to infection of any nature.

"You will, no doubt, observe that two charts only accompany this report; the third, showing the relative incidence of blackwater to cases of malarial fever, I am unable at present to submit owing to complete information regarding the latter disease not yet being available. I propose to forward this with my Annual Medical Report, which is now in course of preparation.*

"It is a matter for regret that cases of blackwater fever have not diminished in number during 1912, and that the mortality is of a higher percentage than the

* Annual Medical and Sanitary Report, Northern Nigeria, 1912.

MONTHLY AND YEARLY INCIDENCE OF CASES FOR THE PAST FIFTEEN YEARS.



4 months
16th January 1913.

W. J. Hall

Acting Principal Medical Officer





average for the past fifteen years. It is, however, of interest to note that only two cases occurred amongst Government officials, the other cases being in persons privately employed. Owing to the mining industry, the latter class of residents has increased greatly during the last four years and still continues to do so. These men are not generally, perhaps, quite so amenable to medical advice as to the health precautions necessary for those resident in tropical Africa as are Government officials. This, I think, may safely be assigned as the probable cause of the marked difference in the incidence of cases among the two classes of individuals."

REPORT ON CASES OF BLACKWATER FEVER IN NORTHERN NIGERIA, 1912.

16

Number of Case.	Locality.			Seasonal Variation.	Personal History.		
	(a) Physical features.	(b) Occurrence of a series of cases.	(c) Insect Fauna.		(a) Medical History.	(b) Previous Movements and Personal Conditions.	(c) Microscopic Examination of the Blood.
Case 8. Death.	Open arable land ...	No recorded cases	Mosquitoes very scarce. Biting flies, none. Ticks, bugs, lice, fleas can be excluded.	Sixth month of harmattan, which was becoming less pronounced.	Several attacks of malaria previously. Dysentery recently. A regular quinine taker.	Lived in a native mud house; had, ten days previous to attack, arrived from a long tour on foot. Was missionary; second tour of service in the Protectorate.	No microscopic examination of blood possible.
Case 9. Recovery.	On border of Southern Nigeria. In midst of thick bush. No swamps here.	One case in the Province in 1907. House within 50 yards of native town.	<i>Glossina palpalis</i> . Mosquitoes numerous.	Rainfall very heavy, but case occurred in the dry season.	Several very slight attacks of malaria. A regular quinine taker.	First tour in West Africa. Twenty months' residence. Lived by himself in a small trading station. European-built house.	As above.
Case 10. Recovery.	On the summit of a hill — situation healthy. No swamps.	No record for some years.	Mosquitoes very scarce, but specimens of <i>Myzomyia</i> and <i>Stegomyia</i> have been found. Sandflies and <i>Stomoxys</i> common.	Case occurred at the end of rainy season. Nothing abnormal to note.	Two slight attacks of gastritis recently. Did not take quinine regularly.	Had been eleven months in West Africa and five years in India. Strong, healthy, energetic man. Native-built mud house with mosquito room.	No parasites found in blood.
Case 11. Recovery.	Bank of River Niger. Swamps. Station well cleared of bush.	No record for years.	Mosquitoes numerous. Sandflies and biting flies prevalent.	During latter part of rainy season.	No previous illness. Did not take quinine regularly.	Residence, eleven months second tour; previous tour three years Southern Nigeria. Native-built house.	Several examinations revealed no parasites.
Case 12. Death.	Thin bush close to large swamp.	Nil	<i>Myzomyia</i> , <i>Stegomyia</i> , <i>Glossina fatigans</i> , ticks, lice, fleas all common.	During rains. Humidity average, 60.	One attack of malaria and one of dysentery. Doubtful if quinine taken regularly.	Second tour. British N.C.O., strong, healthy, of temperate habits. Native - built mud house.	Blood examined on 1st, 2nd, and 3rd days. No parasites found.

Case 13. Recovery.	Close to River Niger. Sandy soil. Some swamps. Bush cleared.	Several treated here (Lokoja Hospital).	Mosquitoes and sandflies very prevalent.	During rains. No- thing abnormal to note.	Yellow fever 20 years ago. Did not take quinine regularly.	Three months' residence in West Africa. Com- fortable European- built house.	No parasites or pigmented leuco- cytes found.
Case 14. Recovery.	Open country ...	Nil ...	Nothing unusual ...	During rains ...	Blackwater once pre- viously. Dysentery one and malaria fever three attacks. Irregu- lar with quinine.	Over two years in residence. Comfort- able, native-built mud house.	As above. Exam- inations made on 2nd, 4th and 8th days.
Case 15. Death.	Close to river bank	One in 1903, two in 1904, one in 1907, one in 1911.	Few mosquitoes. Lived within 100 yards of his la- bours.	During harmattan cold atmosphere.	Malaria in South Africa and South America. Did not take quinine.	Eight months in West Africa. Lived in a grass house. Led a careless, irregular life. Age 63.	No examination possible.
Case 16. Remaining, 31/12/12.	As in 13 ...	As in 13 ...	As in 13 ...	During harmattan...	Malaria on September 12th. Previous attack blackwater, 1911.	Several years' residence in Northern Nigeria. Takes quinine regu- larly. Comfortable house and surround- ings. Missionary.	No parasites or pigmented leuco- cytes found.
Case 17. Recovery.	Open undulating country. House surrounded by long coarse grass. 300 yards from River Nigeria.	No previous case	<i>Stegomyia fasciata</i> . <i>Anoph. funesta</i> , &c., Stomoxys, Hypoboscidae, &c., are all common.	During harmattan, which is very dense here. Daily variation of tem- perature, about 30°.	Typhoid in 1912. Three attacks malaria Sep- tember, October, No- vember, 1912. Irregu- lar with quinine.	Anglo-Indian. Resident in West Africa from early in 1912. House, comfortable wooden bungalow.	Frequent examina- tion gave nega- tive results.
Case 18. Recovery.	High altitude, barren undulating coun- try. No swamps.	No previous case	Mosquitoes very scarce. Flies prevalent.	Latter end of rains.	Severe malaria in Gold Coast some two years previously. Good health during eight months' residence in Northern Nigeria. Ir- regular with quinine.	Strong, healthy, active man, whose em- ployment necessitated much exposure to tropical sun and rains. Mud house in mining camp, situated suitable distance from natives.	Several examina- tions with nega- tive results.
Case 19. Recovery.	The highest altitude in the Protec- torate. Undulat- ing sparsely tim- bered country.	No previous case	Mosquitoes few— <i>Anophelines</i> . Flies numerous.	End of rainy season.	Dysentery recently. Many attacks of malaria dur- ing five years' previ- ous residence on the Gold Coast. Very ir- regular with quinine.	Patient of very slender build. Nature of his employment (mining) subjected him to fre- quent and prolonged exposure to sun and rain.	No examination possible.

UGANDA.

Thirty-two cases of blackwater fever were reported in the Uganda Protectorate during 1912, of which eight proved fatal, giving a death-rate of twenty-five per cent.

The figures for previous years have been as follows :—

1909, 21 cases with 6 deaths, giving a death-rate of 28·5 per cent.

1910, 26 " 6 " " " 23·0 "

1911, 18 " 3 " " " 16·6 "

Sex.—Of the thirty-two cases, twenty-nine were males and three were females.

Age.—This varied from eight years to fifty-five and appears to have no influence.

Nationality.—There were nine Europeans, two Eurasians, one Cape-boy, six Goans, and fourteen Indians.

Deaths.—All the eight deaths occurred in outlying places, and in seven there was either no medical officer or a medical officer did not arrive until the disease was well advanced. These occurred at the following places :—Mabira Forest, 3; Kivuvu, 1; Mityana, 1; and Gondokoro, Gulu, and Chudi-chudi, in the Nile Province, one each. The Mityana case was a motor driver, who was taken into Kampala and died there. The Gondokoro case was the Indian compounder. Of these eight, three were Europeans, of whom one had had two previous attacks, and one had had one previous attack, two were Eurasians, one of whom had had one previous attack, and three were Indians, one of whom had had two previous attacks.

Locality.—As regards locality, no definite relationship of an attack to any particular class of surroundings is shown. In nineteen cases the attack appears to have been acquired in town or station, in eleven in outlying places, *e.g.*, plantations, and in three while travelling.

All the patients had been exposed to the bites of mosquitos, including anopheles, and in some cases there had been exposure to the bites of Simuliidæ, Stomoxys, various other biting flies, fleas, and ticks.

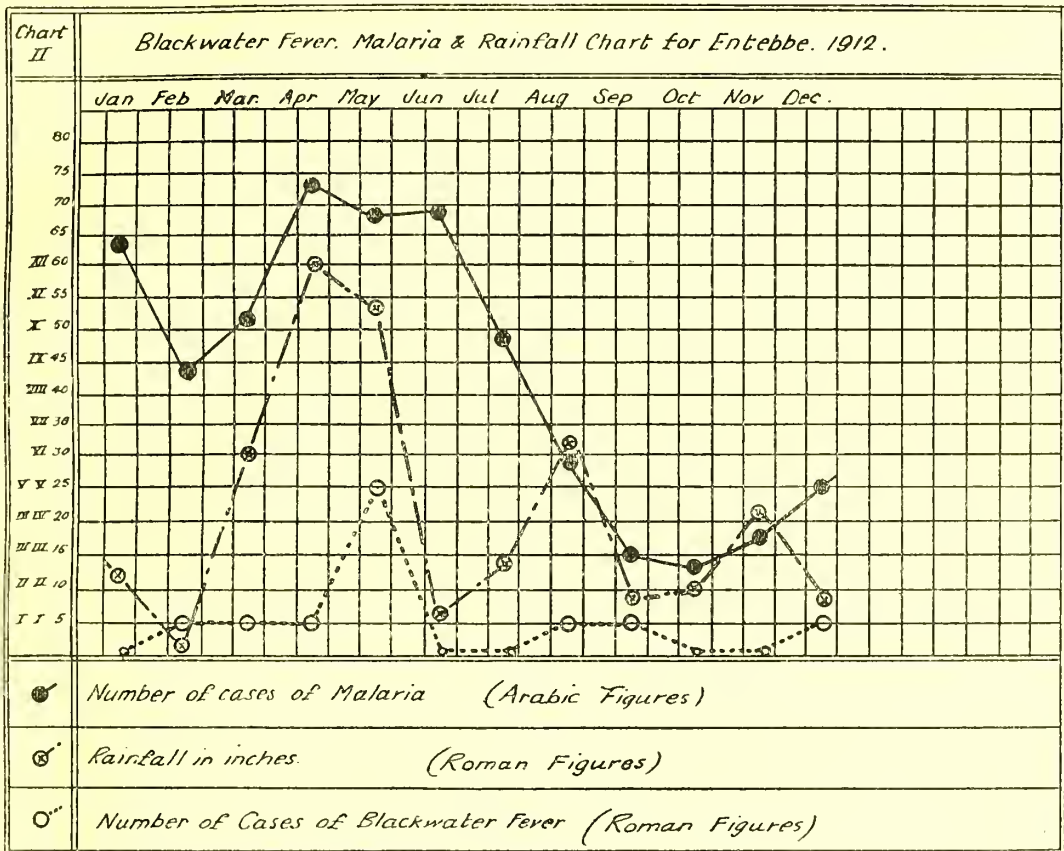
Seasonal variation.—The following chart shows the locality where the cases occurred, and also the season :—

Chart I.

		Blackwater Fever Chart, 1912.													
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	Deaths.
Entebbe	...	—	1	1	1	5	—	—	1	1	—	—	1	11	—
Kampala	...	—	—	—	1	—	—	1	1	—	1	—	1	5	—
Jinja	...	—	—	—	1	—	—	1	—	—	—	1	—	3	—
Bombo	...	—	—	1	—	—	—	—	—	—	—	—	—	1	—
Fort Portal	...	—	—	—	—	—	—	—	—	1	—	—	—	1	—
Gondokoro	...	—	—	—	—	—	—	—	—	—	1	—	—	1	1
Guhe	...	—	—	—	1	—	—	—	—	—	—	—	—	1	1
Mbale	...	—	—	—	—	—	—	—	—	—	—	1	—	1	—
Chudi Chudi	...	—	—	—	—	—	—	1	—	—	—	—	—	1	1
Mabira	...	—	—	—	—	—	1	—	—	—	1	1	—	3	3
Lubanyi	...	1	—	—	—	—	—	—	1	—	—	—	—	2	—
Kururi	...	—	—	—	—	—	—	1	—	—	—	—	—	1	1
Mityana	...	—	—	—	—	—	1	—	—	—	—	—	—	1	1
Total cases	...	1	1	2	4	5	2	4	3	2	3	3	2	32	—
Deaths...	...	—	—	—	1	—	2	2	—	—	2	1	—	—	8

N.B.—Deaths shown in heavy type.

The occurrence of eleven cases at Entebbe is not easy to explain. One of these was in a European, who had probably acquired it while travelling in Buddu as the attack developed the day after his arrival here while in hospital. Two of the other ten cases (five Goans and five Indians) developed it within two days of their arrival here, while the other eight were residents in Entebbe. The following chart gives the rainfall, the number of cases of malaria, and the number of cases of blackwater fever for Entebbe during the year. There appears to be a definite relation between all three.



Personal history.—

(a) *Previous blackwater fever.*—Two of the thirty-two cases occurred in the same European child, aged nine years, who had had two attacks previously; three cases occurred in patients who had had two previous attacks, and four occurred in those who had had one previous attack.

(b) *Previous malaria.*—In every case previous attacks of malaria are recorded, and in six, frequent attacks.

(c) *Quinine prophylaxis.*—Of the thirty-two cases, nine had taken quinine prophylactically for a long period, either grs. 5 daily, or grs. 10 or 15 twice a week on consecutive days. The rest had either taken it only when they had fever, or irregularly when they felt run down. It is noteworthy that, according to the statements made by the patients, of the nine who took quinine regularly as a prophylactic, three were fatal cases.

(d) *Quinine as exciting cause.*—In no case can quinine be said to have been the real exciting cause of an attack.

(e) *Exposure as a cause.*—In six, exposure or over-fatigue is recorded as the exciting cause.

(f) *Length of residence in Africa.*—This varied from one year to twelve years, the average being just over five years.

(g) *Presence of parasites.*—In most cases slides had not been taken before the blackwater fever showed itself, either because the medical officer was not called in in time or because the patient was taking quinine at the time. In eight cases subtertian (ring) parasites were found before the hæmoglobinuria manifested itself. In no case were parasites found after the hæmoglobinuria, even during pyrexia.

(h) *Duration of the blackwater.*—This varied from twelve hours to ten days, the average time being just over forty-eight hours. The case which lasted for ten days was a fatal one, in a European, at Gulu, who had almost complete suppression for eight days with constant bilious vomiting and hiccough, and in which hæmorrhage from the gums, and later from the skin, occurred before death.

Relation to malaria.—These cases tend to show that there is a definite relation between malaria and blackwater fever, and also that a second or third attack is more likely to be fatal than a first attack.

My own experience convinces me that blackwater fever is only likely to occur in those persons who do not take adequate doses of quinine during and after attacks of malaria.

I think the theory that quinine is a factor in the etiology of blackwater fever is too much emphasised, as I am convinced that many people do not take enough

quinine through fear of its bringing on an attack of blackwater fever, and so render themselves liable to an attack. I consider that even when hæmoglobinuria does follow the administration of quinine the patient would almost certainly have got blackwater fever *without* the quinine, only in a more severe form.

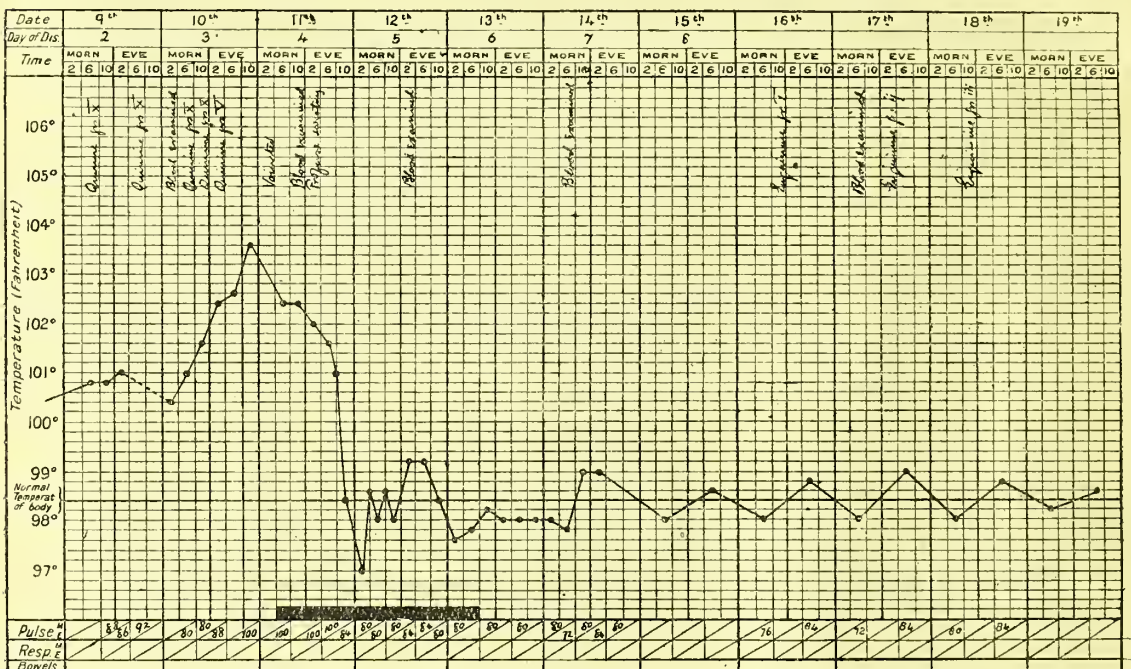
Hæmoglobinuria is, in my opinion, a natural cure of malaria, though a dangerous one. I think this because (1) I have only once found malarial parasites in blackwater cases *after* the onset of hæmoglobinuria, and then there was a relapse of the hæmoglobinuria, after which none could be found, and in many cases no quinine had been given beforehand. (2) I have observed in several cases what Dr. Taylor has found that quinine has little or no effect on pyrexia persisting or recurring after the onset of hæmoglobinuria, which it must have if it were due to malaria.

C. A. WIGGINS.

ENTEBBE.

CASE 20.

February



History of present illness.—On Feb. 8th, 1912, the patient arrived from Bukakata after a long safari in Western Provinces. He stated that he had had a great deal of fever lately, and that he had taken quinine fairly regularly. On the evening of his arrival in Entebbe he had fever again.

He took 20 grs. of quinine this day.

Feb. 9th: In the morning he was admitted to hospital. He had taken quinine, grs. 10 that morning. The blood was examined for malaria; the result was negative. In the evening he was given quinine, grs. 10.

On Feb. 10th quinine, grs. 10 at 8 a.m., grs. 10 at 2 p.m., and grs. 5 at 7 p.m., was given. The temperature rose to 103.6° at midnight, when he vomited, and, soon after, hæmoglobinuria appeared, with profuse perspiration.

On Feb. 11th he passed 64 oz. of urine, all dark, but the colour varied, some was thick like porter, some clear like port. Diet, milk and soda only. Blood examination was negative. The temperature came down to normal. No quinine was given.

Feb. 12th: The temperature rose to 99.2°. The same diet was continued. Champagne, 4 oz., was given three times a day. 45 oz. of urine were passed.

Feb. 13th: The urine was now clearing well. Anæmia was showing in his complexion for the first time; there was some jaundice.

Feb. 14th: The urine was clear: it contained hardly a trace of albumen. He felt very weak. The same diet was continued. Blood examination for malaria parasites was negative.

Feb. 17th : He was allowed to sit up in bed. Diet as before. Port wine, 2 oz., three times a day, was now given instead of champagne. Euquinine, gr. 1 was given.

Feb. 18th : He was allowed to get out of bed to use the commode. Progressing well. Euquinine, gr. 2.

Feb. 19th : Light diet. Euquinine, gr. 3.

Feb. 20th : Light diet. Euquinine, gr. 4.

Feb. 21st : Light diet. Euquinine, gr. 5.

From February 21st to March 3rd he was given ordinary diet. Quinine, grs. 5, *omni die*.

March 4th : Discharged from hospital and left for three weeks' sick leave to East Africa Highlands.

Remarks.

Notes on locality.—Nothing to note.

Notes on seasonal variations.—Nothing to note.

Notes on medical history.—No malaria on medical history sheet since 1910, but he had had fever about him for some months.

C. A. WIGGINS.

Civil Hospital, Entebbe, January, 1913.

During the past year ten cases of blackwater fever have been under my care. Six of these were of a mild type, the urine clearing within two days, and with no special complication. In one case the hæmoglobinuria persisted $4\frac{1}{2}$ days, but beyond considerable vomiting there was no further complication. The remaining three cases had all points of interest, and condensed reports of these are therefore appended.

All ten patients completely recovered and, as far as can be ascertained, have since remained in good health.

Eight of the ten cases give a history of having suffered from repeated attacks of malaria. The remaining two state they have only previously had one or two attacks, but this is probably doubtful, as they have both resided in the country about six years. One of the patients had previously suffered from blackwater fever.

Two of the patients state they have taken quinine prophylactically (usually 5 grains daily) for some considerable time, but with both of these there is a history of almost continuous fever treated with altogether inadequate doses.

Three of the cases were seen before the hæmoglobinuria began, and in all of these sub-tertian parasites were found, but repeated re-examinations after the hæmoglobinuria had commenced were negative; the remaining seven cases were only seen after the hæmoglobinuria commenced, and although repeated examinations of the blood were made no parasites were found at any time.

The length of residence in Uganda or East Africa varies in the different patients from one year to twelve years.

In one case exposure to fatigue and sun whilst suffering from malaria appears to have had some part in bringing on the attack of blackwater. In practically all cases there is a definite history of repeated and carelessly treated attacks of malaria with inadequate doses of quinine. Beyond this, in no case does the administration of quinine appear to have had anything to do with the bringing on of an attack.

Notes on locality and seasonal variation are already given in the Principal Medical Officer's report.

CASE 21.

A Goanese clerk, aged 26.

Previous history.—The patient had resided in Uganda for three years. During this time, and especially during the last year, he suffered from almost continual attacks of malaria, for which he treated himself by taking quinine, grs. 10 to grs. 15, daily.

History of present illness.—He had been feeling feverish and out of sorts for three or four days, for which he took quinine, grs. 10, daily.

On May 20th, as the fever still continued, he took quinine, grs. 10.

On May 21st, at 4 a.m., he first noticed that his urine was black. No parasites were found in the blood. He was put on Hearsey's mixture. At noon he was admitted to hospital. On admission his temperature was 100.8° . At 9 p.m. the temperature was 99.6° .

On May 22nd the temperature was from 97.6° to 99.4° during the day. The urine was still black, but was clearing.

On May 23rd the temperature was normal all day and the urine quite clear.

On May 24th, at 8 a.m., the temperature was 99° . The urine was still clear. At noon the temperature was 103° and the urine was again black. At 8 p.m. the temperature was 99.6° and the urine was now clearing.

On May 25th, at 8 a.m., the temperature was 100.4° , the urine was now quite clear. At noon the temperature was 101° and the urine was again black. At 8 p.m. the temperature was 102° and the urine was clearing. Quinine, grs. 5, was given by the mouth.

On May 26th, at 8 a.m., the temperature was 99° , the urine was quite clear. At 8 p.m. the temperature was 103° , the urine was still quite clear. Quinine, grs. 10, was injected intramuscularly.

On May 27th, at 8 a.m., the temperature was 99° , the urine was clear. Quinine, grs. 10, was now injected intramuscularly. At 8 p.m. the temperature was 103° , the urine was again black.

On May 28th, at 8 a.m., the temperature was 99.2° , the urine was quite clear. At noon the temperature was 103.2° , and the urine was again black. At 8 p.m. the temperature was 100° and the urine was still black.

The patient passed a restless night.

On May 29th, at 8 a.m., the temperature was 99° and the urine still black. Quinine, grs. 10, was now injected. At noon the temperature was 104.5° and the urine was black. At 8 p.m. the temperature was 101° and the urine was still black.

The patient again passed a restless night.

On May 30th, at 8 a.m., the temperature was 99° and the urine was clearing. At 8 p.m. the temperature was 101.8° and the urine was still clearing.

The patient slept well.

On May 31st, at 8 a.m., the temperature was 99° and the urine quite clear. At noon the temperature was 104.8° and the urine again black. At 8 p.m. the temperature was 102.6° and the urine was still black.

The patient passed a very good night.

On June 1st, at 8 a.m., the temperature was 99° and the urine clearing. At noon the temperature was 101.4° and the urine still clearing. At 8 p.m. the temperature was 100.2° and the urine quite clear.

From June 2nd to June 4th the patient had good nights. The temperature varied between 99° and 100° and the urine remained quite clear.

On June 5th the temperature was normal and remained so. He progressed so favourably that he was allowed to go on leave on June 10th.

From June 5th he was advised to take quinine, grs. 5, daily, and continued to take this on the journey to India.

He has now returned from leave and states that his health remains good.

Notes.—This case is of interest in that :—

- (1) The hæmoglobinuria appeared six separate times, and always synchronised with a rise in temperature.
- (2) The quinine administered appeared to have no effect on the hæmoglobinuria or fever. On the other hand, the highest temperature reached (104.8°) was two days after the last dose of quinine was administered, and the temperature became normal without any further quinine being given.
- (3) During the whole illness there was no vomiting and no complications of any kind.

Blood examination was made on several occasions but no parasites were found.

CASE 22.

An Indian fitter in cotton ginnery, aged 35 years.

Previous history.—He had resided for six years in Uganda and East Africa. He stated that he had only had one bad attack of fever before the present illness.

History of present illness.—From August 29th to September 2nd he had pains all over his body and felt feverish. He took quinine, grs. 10, every day during this time.

On September 2nd he felt worse and took quinine, grs. 15, after which he had several rigors and vomited occasionally. At 6 p.m. the temperature was 103° , and he first noticed the appearance of black urine. No malaria parasites were found on blood examination.

He passed a restless night but without vomiting.

On September 3rd, at 8 a.m., he was removed to hospital. The temperature on admission was 101° , and remained so throughout the day. He was given calomel grs. 5 and put on Hearsy's mixture. During the day he had several rigors and vomited on one occasion.

He passed a fairly good night, without vomiting.

On September 4th the urine was still black. The morning temperature was 103.6° , but had fallen by 9 p.m. to 99.6° . He complained of great pain in the back.

He again passed a restless night, but without vomiting.

On September 5th the urine was found to be clearing. The morning temperature was 99.6° . At 9 p.m. the temperature was 100.8° , but the urine was now quite clear.

He slept well.

On September 6th the temperature during the day ranged between 97° and 99° .

He passed a restless night, during which he had several rigors.

On September 7th, at 7 a.m., the temperature was 102° , rising at noon to 104° . He had several rigors during the day and vomited twice. The urine, however, remained clear. At 9 p.m. the temperature was 103° .

He passed a fairly good night.

On September 8th the morning temperature was 99° . He had several rigors. Quinine, grs. 20, was injected intramuscularly. He vomited once during the day. The evening temperature was 99.6° .

During September 9th and September 10th the temperature remained between 100° and 101° , and there were several rigors. Quinine, grs. 5, was injected intramuscularly each day.

During September 11th and September 12th the temperature remained between 102° and 103° . There were several rigors. Quinine, grs. 20, was injected each day.

On September 13th the morning temperature was 101° , it fell by evening to 99.4° . There were several rigors during the day. Quinine, grs. 20, was injected.

On September 14th the morning temperature was 99.6° . There were several rigors during the day. Quinine, grs. 10, was injected. The evening temperature was 100.4° .

From September 14th to September 28th the temperature varied from normal in the morning to 103° in the evening, with daily rigors. No quinine was injected after the 14th, but Warburg's tincture, 5 i, was given three times a day after September 18th.

From September 28th to September 30th the temperature varied between 98° and 99° in the morning and 100° and 101° in the evening. No further rigors occurred, and the general condition improved very much.

On October 1st the temperature was normal and remained so.

On October 15th he returned to work.

Notes.—This case is of interest on account of (1) the large number of rigors continued daily for more than three weeks, (2) the large doses of quinine injected with apparently very little effect on the temperature (3) the non-recurrence of the hæmoglobinuria in spite of the high temperature and large doses of quinine.

The blood was repeatedly examined without any parasites being found.

CASE 23.

A Hindoo clerk, aged 35.

Previous history.—About seven years before his present illness he first came to Uganda, but had been away on leave three times during this period. He had suffered while in Uganda from repeated attacks of malarial fever; he last returned from leave in June, 1911, since when his medical history sheet showed six repeated attacks of fever for which he was placed off duty. He stated that in addition to these attacks he continually felt out of sorts, and that he had had numerous slight

attacks of fever, which, however, did not prevent his going to work. He also stated that for two years he had been unable to take even five grains of quinine without its causing blood to appear in his motions. This statement the medical officer in charge of the case was able to verify on one occasion.

History of present illness.—On Aug. 16th and 17th he had aches and pains all over the body, but no fever.

On Aug. 18th he felt sick. There was considerable pain over the stomach, and he considered that he had had fairly high fever. He took aspirin, grs. 5.

On Aug. 19th the temperature was 98.2° . He felt better in the morning, but later, again felt sick. At noon he was given calomel, grs. 3, and *sodii bicarb.* The bowels were well opened, and he felt better, but complained of pain in both shoulders. He was given the bicarbonate of soda to take with his food. The afternoon temperature was 98.6° .

On Aug. 20th, at 6 a.m., he took a teaspoonful of magnesium sulphate in a tumblerful of water. At 8 a.m. he felt better and attended his office;—so far he had not been off duty. At 10 a.m. he vomited bile and sought medical advice at the dispensary. The temperature was now 98.9° . He was pale and slightly jaundiced. He was sent home to bed, where he vomited several times, bringing up a little bile on each occasion. At 3.30 p.m. the temperature was 102.2° . A blood film was taken and showed, on examination, sub-tertian parasites. He took quinine, grs. 10. He vomited subsequently, but apparently kept the quinine down.

He passed a restless night till 2 a.m.

Aug. 21st: He slept from 2 a.m. till 7 a.m., when there was considerable pain over the stomach. At 8 a.m. the temperature was 101° and the pulse rate 100. He now passed urine containing blood. He was put on Hearsey's mixture. At 4 p.m. the temperature was 105° and the pulse rate 112. He perspired freely, and in the evening the temperature fell to 102° . During the day he passed large quantities of black urine.

He passed a restless night, vomiting constantly.

Aug. 22nd: The morning temperature was 104° , the pulse rate 124. The vomiting continued, and he still continued to pass large quantities of black urine, which, however, began to clear towards evening. The evening temperature had fallen to 102° and the pulse rate to 120.

He vomited all night, and did not sleep.

Aug. 23rd: The morning temperature was 103° and the pulse rate 124. The urine was now quite clear. During the day vomiting continued incessantly. The temperature ranged between 103° and 101.6° . The pulse, 124 beats to the minute, was very weak and irregular. Nutrient enemata were given every two hours. Two injections of strychnine, gr. $\frac{1}{30}$, were given, and at night, on account of the restlessness, an injection of morphia, gr. $\frac{1}{4}$.

He slept a little after the morphia, but the restlessness and vomiting returned later.

Aug. 24th: The temperature during this day ranged between 102° and 104° . Vomiting and retching continued although nothing was given by the mouth except the *acidus hydrocyanicus dilutus*, m 4, in a teaspoonful of water three times during the day. The pulse, 124 beats to the minute, was very weak and irregular, consequently three injections of strychnine, gr. $\frac{1}{30}$, were given. Nutrient and normal saline enemata were given at intervals. There was great restlessness, for which morphia, gr. $\frac{1}{4}$, was injected at night.

He slept well.

Aug. 25th: The pulse was more feeble and irregular. There was less vomiting, but he could keep nothing down. The saline and nutrient enemata were continued. The temperature ranged between 100.8° and 102° , the pulse rate between 104 and 112. Quinine, grs. 20, was given *per rectum*, and the dilute hydrochloric acid continued by the mouth.

He slept at intervals without vomiting.

Aug. 26th: He took a little milk and soda by the mouth. The temperature ranged between 100° and 100.4° , the pulse rate varied between 100 and 102. Strychnine was injected intramuscularly.

He passed a restless, sleepless night, without vomiting.

Aug. 27th: The temperature ranged between 101° and 102° ; the pulse, 104 to 120 beats to the minute, became more weak and irregular. There was now no vomiting, and the patient was able to take milk and soda water and barley water, by the mouth. Saline enemata were given and quinine, grs. 16, was given by the

rectum. Three injections of strychnine, gr. $\frac{1}{30}$, were given during the day, and an injection of morphia, gr. $\frac{1}{4}$, at night.

He slept well.

Aug. 28th: The temperature ranged between 94.6° and 100° during the day. The pulse rate was 124. There was no vomiting, and he was able to take sufficient nourishment by the mouth. Two injections of strychnine were given, and the saline enemata were continued.

During the night there was some vomiting, the patient had little sleep and became restless and excited, resisting all attempts to give nourishment by either mouth or rectum. He spat out all food put into his mouth, and said that he wanted to die.

Aug. 29th: The morning temperature was 101° , the pulse rate 130. Vomiting occurred several times. Later in the day he became less restless and took a table-spoonful of milk, but spat out the rest. A soap and water enema was given followed, after it had had the required effect, by nutrient enemata. At 4 p.m. the pulse, 140 to 150 beats to the minute, was almost imperceptible. One pint of normal saline solution was injected subcutaneously into the chest-wall, after which the pulse rate came down to 120. At 8.30 p.m. the temperature was 102.8° , the pulse, 140 beats to the minute, stronger. During the evening he took a little milk at intervals. Two injections of strychnine, gr. $\frac{1}{30}$, and one of quinine, grs. 10, were given during the day, and an injection of morphia, gr. $\frac{1}{4}$, was given at night.

(He slept well till 2 a.m.)

Aug. 30th: From 2 a.m. onwards he was restless. He refused to be given nutrient enemata but took sufficient milk by the mouth. The temperature during the day ranged between 101° and 104.5° , and the pulse rate between 130 and 101. The pulse was less irregular. Quinine, grs. 10, was injected. Strychnine, gr. $\frac{1}{30}$, was injected three times. He complained of great pain in the stomach.

He slept well, and there was no vomiting during the night.

Aug. 31st. A soap and water enema was given with good result. The temperature ranged between 99.8° and 100.8° and the pulse rate between 116 and 130. An enema of normal saline solution was given. Strychnine was injected three times. An intramuscular injection of quinine, grs. 10, was given once and morphia, gr. $\frac{1}{4}$, was injected at night.

He slept fairly well till 3.30 a.m.

Sept. 1st: After 3.30 a.m. he became restless and feverish, and vomited several times. The morning temperature was 103.8° and the pulse rate 130. Quinine, grs. 20, was injected intramuscularly. Vomiting continued, and he refused to be given nutrient enemata. The evening temperature was 100.6° , the pulse rate 120. After 9 p.m. he was able to keep down a little milk and soda water. One injection of strychnine was given during the day.

During the night he vomited several times, but slept at intervals.

Sept. 2nd: The temperature during the day ranged between 98.4° and 98.6° ; the pulse rate was 120. Quinine, grs. 20, was injected intramuscularly. He vomited two or three times during the day, but kept down a little milk and soda water. He refused to be given nutrient enemata. Morphine, gr. $\frac{1}{4}$, was given hypodermically at night.

He passed a restless night, vomiting at intervals.

Sept. 3rd: During the day the temperature ranged between 98° and 99° and the pulse rate between 112 and 120. Saline enemata were given. Although there was no vomiting during the day the patient refused to take anything by the mouth.

He slept fairly well.

Sept. 4th: The morning temperature was 99.6° and the pulse rate 130. Respirations 40 to the minute. There were signs of hypostatic congestion at the bases of both lungs. He was propped up in bed at intervals for a few minutes. He began to ramble in talk, and was quite unable to understand and answer questions. In the afternoon the temperature fell to below normal, the pulse became very weak, irregular, and difficult to count. Throughout the day he was given brandy and milk in small quantities, and the *liquor strychninae hydrochloridi*, m 4 by the mouth. There was no vomiting. At 7.45 p.m. the pulse, 124 beats to the minute, was less irregular. He now felt cold, and appeared to be falling into a state of collapse. Brandy and hot milk were given, and hot bottles were applied to the feet and body. At 9.30 p.m. he was in a more or less collapsed semi-conscious condition. Teaspoonful doses of hot milk and brandy were continued. He went

to sleep for an hour and awoke in a delirious condition, talking nonsense and trying several times to get out of bed.

He passed a night of broken sleep with intervals of restlessness and delirium. He continually made attempts to get out of bed.

Sept. 5th: At 7.30 a.m. the temperature was 99.6° , the pulse rate 116. Breathing was heavy and difficult. He now paid no attention to questions, but continued muttering to himself. He swallowed teaspoonfuls of brandy and milk when they were put into his mouth. There was no vomiting. Digitalin, gr. $\frac{1}{100}$, was injected. At noon the temperature was 100.4° , the pulse rate 136. Respirations were 34 to the minute, and he was breathing more easily. He made several attempts to get out of bed. At 2 p.m. digitalin, gr. $\frac{1}{100}$, was injected, the pulse rate was 128. At 9 p.m. the pulse rate was 140. Strychnine, gr. $\frac{1}{30}$, and digitalin, gr. $\frac{1}{100}$, were injected. At 9.30 p.m. he became very restless, trying continually to get out of bed. Morphine, gr. $\frac{1}{4}$, was injected.

He had a fairly good night.

Sept. 7th: He was now more sensible. The temperature was 100.8° , the pulse rate 125. There was less congestion at the bases of the lungs, and the breathing was much easier. Quinine, grs. 10, was injected and *tinct. digitalis* was given by the mouth. There were signs of abscess formation at the site of the intramuscular injection of the saline solution, and poultices were applied. He vomited several times during the day, but kept down sufficient nutriment and stimulants. The evening temperature was 103° , the pulse rate 126.

He slept at intervals.

Sept. 8th: He was now much more sensible. He complained of pain in the back of the head and stomach. At 7.30 a.m. the temperature was 98.6° ; the pulse, 112 beats to the minute, was much more regular and strong. An abscess at the site of the saline injection was opened and a considerable amount of foul-smelling pus escaped. The temperature during the day varied between 99° and 102.5° , and the pulse rate between 120 and 140. Respiration was much easier, and the swelling of the legs was decreasing. Digitalis and strychnine were given by the mouth during the day, and the morphine, gr. $\frac{1}{4}$, was injected at night.

He slept better.

Sept. 9th: He was now much brighter. The temperature was 98° all day, the pulse was regular; its rate varied between 112 and 130.

From this day he continued to make slow but uninterrupted improvement. For a fortnight the temperature rose from 98° or 99° in the morning to 100° in the evening, but there was a daily increase in strength. By the end of the month he was able to walk about the house a little, and on October 13th he was well enough to go to East Africa on "local leave." He returned to work in November and continued to enjoy good health.

Blood films were daily taken and examined from August 20th to September 1st, inclusive, but only in the first one—taken before the hæmoglobinuria had set in—were malaria parasites found.

From the beginning of October he was put on quinine, grs. 5, daily, which was continued without the re-appearance of blood in the motions.

Notes.—The special points of interest in this case are:—

- (1) The presence of malarial parasites in the blood before hæmoglobinuria appeared.
- (2) The complete disappearance of parasites immediately the hæmoglobinuria commenced.
- (3) The persistence of fever, vomiting, cerebral and other serious symptoms long after the disappearance of the hæmoglobinuria and without any indication of suppression; during the whole illness urine was passed in practically normal quantities.
- (4) The large amount of strychnine and digitalis (twenty-five injections in addition to several doses by mouth) necessary to prevent heart failure, at times with remarkably good results.
- (5) The administration of considerable doses of quinine with slight effect on the temperature but without producing any reappearance of the hæmoglobinuria. If there is anything in the quinine theory of black-water, it is difficult to understand how the administration of quinine in the amounts given could fail to produce a recurrence of the hæmoglobinuria.

APPENDIX.

Since writing the above report Dr. J. Howard Cook, of the Church Missionary Society, has kindly sent me notes on the cases of blackwater fever that have come under his care at Namirembe, Kampala, during 1912.

No.	Nationality.	Age.	Sex.	Locality.	Month.	Result.
(i)	Indian	Adult	M.	Kampala	January	Cured
(ii)	"	"	M.	"	February	"
(iii)	"	"	M.	"	March	"
(iv)	"	"	M.	"	April	"
(v)	"	"	M.	"	April	"
(vi)	"	"	M.	"	July	"
(vii)	Goan	"	M.	"	July	"
(viii)	"	"	F.	"	August	"
(ix)	Indian	"	M.	"	September	"
(x)	Goan	"	M.	"	October	"
(xi)	"	11 years	M.	"	October	Died
(xii)	Indian	Adult	F.	"	November	Cured
(xiii)	English	28 years	M.	Congo Safari	November	"

Notes.—In all the cases except (i) and (v) quinine had been taken beforehand.

In all cases except (i) and (ii) the treatment used during hæmoglobinuria was a preliminary dose of calomel, followed by Hearsy's mixture (*sodii bicarb.* gr. 15, *liq. hydrarg. perchlor.* B.P., $\frac{1}{2}$ drm., *aq. ad* oz. 1) every two hours first day, every three hours after that till hæmorrhage stopped. In (iii) there was considerable cerebral excitement, and in (viii) there was a relapse of the hæmoglobinuria.

Number (xi) was the only fatal case. Complete suppression occurred in spite of active treatment; but after exhibiting pituitary extract, strophanthus, digitalis, and especially diuretin, the urinary function was completely restored, but patient got more and more œdematous about the face, and weaker, and died. He was passing over two pints of urine per diem when he died.

Number (xiii) was a very severe case, with unconsciousness and delirium lasting three or more days. Eventually he made a complete recovery.

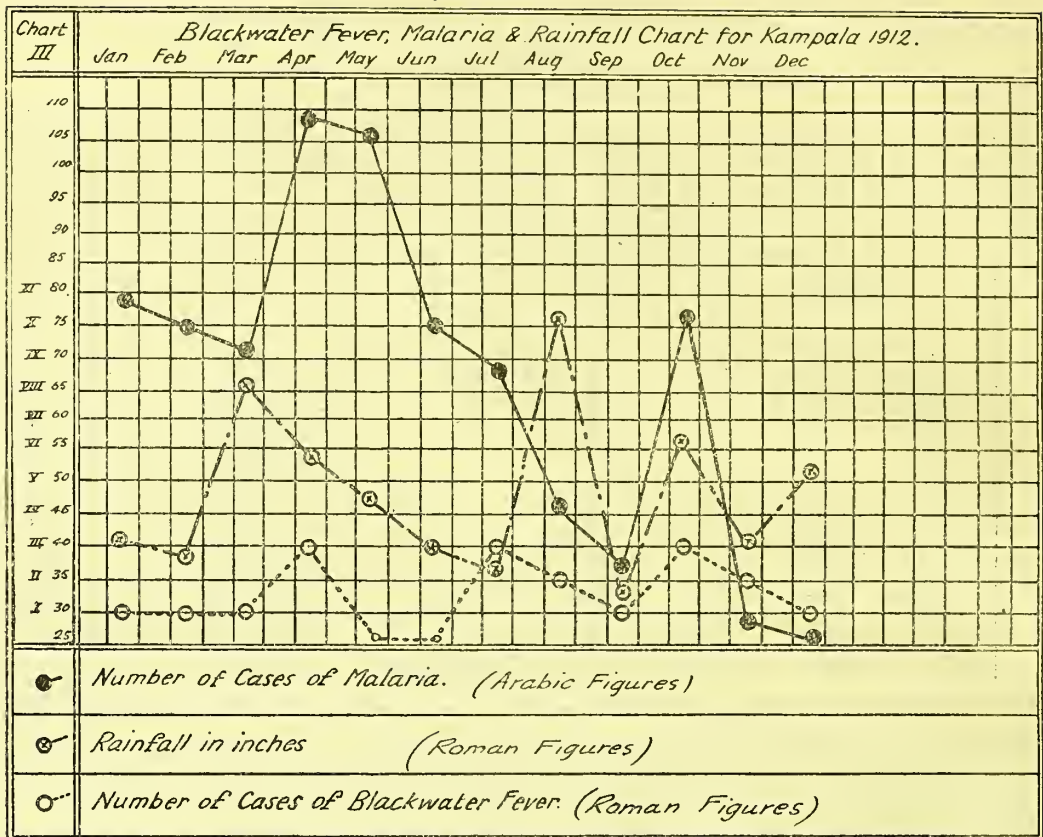
It is a noteworthy fact:—

- (1) All the cases but one (xiii) come from the Indian bazaar at Kampala, which is a hotbed both of malaria and blackwater fever.
- (2) Not a single case occurred amongst the Baganda.
- (3) The cases were mostly mild.
- (4) The notes do not show how long the patients had been resident in the country, but they—so far as my memory serves—were mostly residents of some standing who had had several slight attacks of malaria, and in some cases tick fever, and in a few cases the attack was precipitated by quinine.

J. HOWARD COOK, M.S., M.B., F.R.C.S.

It is noticeable that there are no cases of blackwater fever in Kampala during May, the month during which five cases occurred in Entebbe, 25 miles distant, and one of the months during which malaria is at its worst.

I attach a chart showing malaria, blackwater, and rainfall curves as given above (*vide* Chart II) for Entebbe in the main report.



N.B.—The rainfall is abnormal and more irregular than is usual. The malarial cases shown in the chart represent only those attended at the Government hospitals and dispensaries, but the curve may be taken as representing fairly accurately the incidence of malaria at Kampala. The blackwater fever cases include Dr. Cook's as well as the Government hospital ones, *i.e.*, all the cases which occurred at Kampala.

C. A. WIGGINS.

NYASALAND.

(For the year ending March 31st, 1913.)

In forwarding the annual report on blackwater fever in the Nyasaland Protectorate during the year 1912-1913 the Principal Medical Officer says:—

It will be observed that in the year just ended eleven cases have come under the treatment of medical officers, as compared with five in the year preceding.

A statement is appended which gives in tabular form information under certain headings. The bulk of the cases, it will be noted, has occurred in the Highlands; and a majority of these among planters. The explanation of this is to be found in the fact that by far the larger proportion of Europeans is settled in the Highlands, many of whom are engaged in the planting industry, and resident in proximity to large bodies of native labourers. The opportunities for contracting malarial infections repeatedly are, therefore, greater among this class of the community.

Case.	Occupation.	Under the care of	Station.	Highlands or Lowlands.	Method of Treatment.	Result.
24	Indian Assistant Station-master.	Dr. Old ...	Port Herald.	Lowlands ...	Symptomatic ...	Died.
25	Planter...	Dr. Eldred ...	Cholo ...	Highlands...	Hearsey formula	Recovered.
26	Planter...	Dr. Eldred ...	Limbe ...	Highlands...	Hearsey formula	Died.
27	Surveyor ...	Dr. Eldred ...	Mlanje ...	Highlands...	Hearsey formula	Recovered.
28	Clerk ...	Dr. Eldred ...	Blantyre ...	Highlands...	Hearsey formula	Recovered.
29	Planter...	Dr. Eldred ...	Likulezi ...	Highlands...	Hearsey formula	Recovered.
30	Planter...	Dr. Eldred ...	Mlanje ...	Highlands...	Hearsey formula	Recovered.
31	Planter...	Dr. Barclay ...	Mlanje ...	Highlands...	Symptomatic ...	Recovered.
32	Planter...	Dr. Stannus ...	Zomba ...	Highlands...	Symptomatic ...	Died.
33	Planter...	Dr. Stannus ...	Mpimbi ...	Lowlands ...	Symptomatic ...	Died.
34	Business ...	Dr. Bury ...	Fort Johnston.	Lowlands ...	Symptomatic ...	Recovered.

PORT HERALD. (LOWER RIVER.)

CASE 24.

There has not been a case of this disease on the Lower River for the last few years until 1913.

On January 20th the Hindu Assistant Station-master was attacked; he did not call in assistance until the next day, when suppression of urine had already set in; he died at the end of the fourth day of the attack.

Locality.—(a) *Physical features.*—His two-room quarters were in a row of brick buildings occupied by the Indian employees of the railway, one or two hundred yards from the station.

Short jungle-grass surrounded the buildings almost to the walls, but there is practically no bush or forest tree near. It is a couple of hundred yards from the Shire River.

There was an extensive swamp, formed by the December rains, to the south of that side of the township, and directly north-east of the station and Customs Office. The land is water-logged and the grass marshy.

(b) *Occurrence of a series of cases in any one place.*—There has been no other case. Native employees live quite close.

(c) *Insect fauna.*—Mosquitoes are very numerous at the place. A sample of these has been collected and forwarded by themselves. *Musca domestica* is numerous and a few tabanus and hæmatopota may occasionally be seen. There were said to be no domestic biting insects besides.

Seasonal variation.—The month of December gave the highest rainfall ever recorded here, namely, 20·63 inches. January and February were hot and practically rainless (4·73 and 3·41 inches, respectively).

The hot, dry months of November and December gave a maximum temperature of 115° in verandah shade (iron and grass roof).

Personal history: (a) *Medical history.*—He had had small-pox, but no malaria in India; whilst in Port Herald, on the contrary, he had been constantly getting fever during the twelve months, about once every fortnight; for these attacks he did not seek medical advice. He stated that he took 10 grains of quinine in solution four times a week; this dose three times a day when he had fever, followed by twice daily. Three daily doses were taken on the 18th and 20th, fever having started on the night of the 19th, preceded by a week's malaise.

(b) *Previous movements and personal conditions.*—He came to the Protectorate a year ago, and, with the exception of a week-end trip to Blantyre, had been all his time at his station.

His quarters were two very small rooms. The window aperture had gauze shutters, but there were open spaces between the roof and the tops of the walls, and the door was not mosquito-protected. A bed-net was in use.

(c) *Microscopic examination of the blood.*—Smears were taken from the finger (blood droplet got with difficulty), and shortly after death from bone marrow (fluid) of tibia, and by an exploring syringe from the region of the liver and the spleen, and forwarded to England for examination.

ADDITIONAL NOTE. January 21st.—I received a message to see him at 9 a.m. His urine the previous evening was said to have been like porter, also during the night and the following early morning. All had been thrown away. He was perspiring, with a temperature of 105°, restless, and vomiting severely. Bowels acted freely on 20th after Eno's fruit salt. Tongue very dry. Dark, coffee-coloured urine, 49 c.c., passed at 4.30 a.m. on the 22nd. Heart was normal, and pulse 128. Temperature dropped to 103° on evening of 21st and 102° during the next morning. The following evening it was below 100°, above which it did not again rise. At 7 a.m. of the 23rd, 230 c.c. of coffee-coloured urine was passed. Vomiting continued, very severe and bilious. Hiccough was most troublesome throughout. Insomnia constant. Morphia gr. $\frac{1}{3}$, with atropine, was given twice daily. No urine was passed except the small quantities on the two occasions mentioned.

Treatment: Copious drinks were given. Blue pills and "Eno's" were administered daily, and he had a mixture of digitalis and arsenic. (I have found that calomel sometimes produces stomatitis in these cases.)

Delay in getting under medical treatment is often fatal in this disease, even although "suppression" is not yet complete. Treatment of suppression cases seems hopeless. In two other cases (Europeans) of this condition that I have had each lived for ten days; this man had only the physical strength to hold out for some four

days. My success with cases, during about twelve years, has been as satisfactory as with other methods of treatment. Dr. Hearsey's well-known treatment is, perhaps, the only other really good one, and has certain advantages. The palatinoid form of that prescription should be kept by planters.

I have been in the habit of giving quinine in very small doses, three times daily, soon after the "red water" ceases, increasing the dose daily, according to circumstances. Sometimes the urine again gets a claret tinge, but it usually has no bad effect. Such patients, too, if they continue correct quinine-taking, do not require invaliding merely on account of the blackwater, or get another attack. Considering everything, I am still of the opinion that blackwater fever is a combination of the toxic effects of chronic malaria and quinine, reacting the one on the other during a certain state of the blood, which it is for the modern bacteriologist to describe and explain.

J. E. S. OLD,
Medical Officer.

CHOLO. (SHIRE HIGHLANDS.)

CASE 25.

A planter, living at Cholo.

History of present illness.—The attack commenced on the afternoon of the 25th of April. Had fever on the 23rd; was normal on the 24th. He took quinine bisulphate, gr. 10.

On April 25th, at 2 p.m., the temperature was 106.2° ; he passed urine and went to bed. At 4 p.m. he passed a porter-coloured urine, normal in quantity, which became solid on boiling. I saw him at 12 noon on the 26th. He had taken castor oil; the bowels had acted freely. He was sweating profusely; pulse good, 70. Temperature 100.5° ; respirations good; there was a great deal of bilious vomiting. He was passing a large amount of practically black urine. The urine continued the same till next morning, then gradually began to clear; and on morning of 28th (fourth day of disease) was quite clear; albumen nil.

During the first 30 hours the stools were fluid and contained a large amount of either blood or hæmoglobin. (I had no means of determining which.)

Treatment.—Normal salines were commenced at once per rectum, and Hearsey's formula given in doses of *liq. hyd. per.*, m 40, and *sod. bic.*, gr. 10, every two hours, gradually decreasing to every four hours.

On May 11th (seventeenth day of disease) he was admitted to hospital, as he had apparently recovered sufficiently to stand the journey, and lived too far off for the Medical Officer to be constantly visiting him.

On admission he said that he felt as if he was in for a "go of fever." Had slight temperature, which continued to rise.

Quinine was commenced on morning of 13th—gr. 5 hydrochlor. by mouth. At 6 p.m. on same day he again passed hæmoglobinuric urine. At 1 a.m. on the 14th the temperature suddenly fell from 101° to 95° ; he had a very severe rigor with vomiting and collapse; became almost pulseless; very rapid breathing.

After a hypodermic injection of strychnine and brandy by mouth he rallied. Original treatment was recommenced on 13th, and on the 15th the urine was clear again, and he was progressing well. He maintained a steady improvement, and was discharged convalescent on June 3rd.

Remarks.

1. *Locality.*—From Cholo, Shire Highlands.

(a) *Physical features.*—Thickly wooded plateau; elevation about 3,000 feet. Misty and hot in the valleys, but patient's house was on the bare hill-top.

(b) *Occurrence of a series of cases in any one place.*—Case 3 of 11th October, 1911, was from this place, in a house lower down the hill; it ended fatally.

Case 2, of 19th February, 1911, was also from this district, and ended fatally.

A mild case is said to have occurred in a European living near the patient, just previous to his attack. The houses are well away from any native dwellings, except house servants quarters.

(c) *Insect fauna.*—Larvæ of anopheles were found in pools on both sides of

the patient's house, about 400-500 yards from the house. Adult specimens appeared to be *Funestus*.

2. *Seasonal variation*.—Nothing of note.

3. *Personal history*: (a) *Medical history*.—Was a regular quinine taker—sulphate in tabloids, gr. 5 daily. Previous diseases: dysentery 1900; some heart trouble previous to that; no present signs of cardiac disease.

(b) *Previous movements and personal conditions*.—He had lived in the present house for over a year; before that he was living in house lower down the hill. For a week before this attack of blackwater he had been working day and night erecting machinery in a new rubber factory. He had been out six years, interrupted by two short trips to the Cape.

(c) *Microscopic examination of the blood*.—Blood examination was negative for malarial parasites at all stages.

A. G. ELDRED,
Medical Officer.

LIMBE. (SHIRE HIGHLANDS.)

CASE 26.

A planter, living at Limbe.

The attack commenced on May 2nd with a rigor, bilious vomiting, and passage of about 4 ounces of port wine coloured urine. Had felt feverish the night before and taken quinine bisulph. gr. 10. The temperature when seen on May 2nd was 99°, pulse 100; bowels had acted twice.

Treatment was commenced with rectal salines and Hearsey's formula. Abundant fluid diet by mouth. He continued to pass a very large quantity of porter-coloured urine (6-8 pints in twenty-four hours), full of albumen, till the fourth day of the disease; the urine then cleared, and by the evening was normal in reaction.

The pulse, respirations, and temperature continued to increase, however, till, on the evening of the fourth day, the temperature was 106°, with feeble pulse of 120-130, and respirations of 48.

Intramuscular injections of quinine and cold sponging reduced the temperature to 101°, but he continued very restless and sometimes delirious. Strychnine and digitalis were given for the heart symptoms. He continued to pass a large amount of normal urine, but otherwise his condition did not improve; the pulse rate ranged from 110-130; respirations always over 40; lungs clear; no heart murmur. Spleen slightly enlarged. Very drowsy; extreme anæmia.

Quinine intramuscular injections were continued, and an apparent improvement resulted, but was not maintained, and the patient died, presumably of heart failure, on the 8th day of the disease.

A peculiar feature was the very large amount of urine passed from the very beginning—6-8 pints daily.

This was the second attack of blackwater. He had a previous attack eighteen months before at Chinde.

Remarks.

1. *Locality*.—Taken ill at Limbe, but had recently come up from the Zambesi.

(a) *Physical features*.—Zambesi River.

(b) *Occurrence of a series of cases in one place*.—Living on a Zambesi steamer, with native passengers and crew, and an abundant variety of mosquitoes, all in close proximity.

(c) *Insect fauna*.—Mosquitoes abundant.

2. *Seasonal variations*.—Nothing of note.

3. *Personal history*: (a) *Medical history*.—Blackwater eighteen months ago at Chinde; a severe attack. Very vague as to previous malarial attacks, but had probably had a good deal of fever. Was not a regular quinine taker. Confessed to a large consumption of $C_2H_5(OH)$.

(b) *Previous movements and personal conditions*.—Up to about three weeks before this last attack had been either on a Zambesi steamer or living on the lowlands, near Port Herald. Had been out five or six years.

(c) *Microscopic examination of the blood.*—Blood examinations made on the 2nd and 3rd days were negative for malaria parasites; some polynuclear increase.

A. G. ELDRED,
Medical Officer.

MLANJE. (SHIRE HIGHLANDS.)

CASE 27.

Surveyor, Public Works Department.

The attack commenced on August 16th, while the patient was in camp in the Luchenza District.

He was admitted to hospital on August 17th.

On admission the temperature was 104° , the pulse rate 100. There was some tenderness and slight enlargement of spleen; vomiting.

His general condition was fairly good. He was passing a rather scanty amount of porter-coloured urine, about half albumen on boiling.

Treatment.—Calomel, gr. 3, on admission; normal salines commenced at once, and Hearsy's formula given every three hours. Urine steadily cleared, and by the morning of the 4th day was normal, and a good quantity was being passed. Patient made an uninterrupted recovery. Was put on an iron and arsenic mixture during second week, and on 12th day was allowed to sit up.

Discharged convalescent on September 5th.

Remarks.

1. *Locality.*—For the past few months had been working under canvas in the Mlanje and Luchenza Districts. Before that was at Port Herald.

(a) *Physical features.*—Fairly thickly wooded country, numerous streams; elevation about 2,000-3,000 feet.

(b) *Occurrence of a series of cases in any one place.*—*Vide* Case 1, of 25th April, 1912, and Cases 2 and 3, of 19th February, 1911, and 11th October, 1911, also Case 1 for year ending 31st March, 1912.

(c) *Insect fauna.*—No facilities for obtaining such details, but it is probable that mosquitoes and other biting insects were abundant.

2. *Seasonal variations.*—Nothing of note.

3. *Personal history:* (a) *Medical history.*—First attack of blackwater. Had a lot of slight fever during the last few months. Was a regular quinine taker—10 gr. *quin. hydrochlor.* twice weekly. A man of regular habits.

Eleven years of service, out this tour two years.

(b) *Previous movements and personal conditions.*—Living under canvas, exposed to extremes of temperature.

(c) *Microscopic examination of the blood.*—Blood examination on the day of admission was negative for parasites; some pigmented white corpuscles were seen; polynuclear count 85 per cent.

A. G. ELDRED,
Medical Officer.

BLANTYRE. (SHIRE HIGHLANDS.)

CASE 28.

Aged about 40. First attack.

Previous history.—Out eight or nine years. C_2H_6O up to a year ago; specific history. Had been living in Blantyre for last three months, before that was at Chiromo. Was not a regular quinine taker. No fever lately, but used to get a fair amount of slight fever when in Chiromo.

History of present illness.—Blackwater commenced on the morning of October 2nd. Had been feeling seedy the day before, and took 10 gr. of quinine hydrobromide and a similar dose a few hours after; also took calomel and a saline on the morning of the 2nd.

On admission (2nd October, 1912), temperature 101° , general condition good.

passing a fair amount of port wine coloured urine, full of albumen. Spleen only slightly enlarged, tender; liver not enlarged, other organs appeared normal.

Treatment.—Hearsey's formula every three hours, and rectal salines every four hours; fluid diet. The bowels had acted freely before admission.

3rd October, 1912.—Urine much darker, but he still passed a good quantity. Temperature rose to 103° during the night, and he had a very slight rigor. Slightly jaundiced, and complained of nausea.

5th October, 1912.—Urine much clearer: as the salines were causing him a lot of discomfort and excessive bowel action, they were discontinued, and as the urine continued to clear and be of good quantity, they were not resumed.

7th October, 1912.—Urine quite normal, general condition good. From this date the patient continued to make a good recovery, and he was discharged convalescent on October 18th, 1912.

Remarks.

1. *Locality.*—Had been resident in Blantyre for the last three months, and before that had been living at Chiromo.

(a) *Physical features.*—Blantyre is situated at about 3,000 feet; Chiromo at a little above sea level.

(b) *Occurrence of a series of cases in any one place.*—I believe that very few cases of blackwater have occurred among people who have been resident in Blantyre for any long period; in most cases it has been elicited that they have recently been travelling.

(c) *Insect fauna.*—*Funesta* appears to be the commonest mosquito in Blantyre, other biting insects are not abundant.

2. *Seasonal variation.*—Nothing of note.

3. *Personal history:* (a) *Medical history.*—Not a regular quinine taker; history of C_2H_6O up to a year ago, also specific history a few years ago. Very little fever while in Blantyre, but fairly frequent attacks while at Chiromo. Had been engaged in an office while in Blantyre.

(b) *Previous movements and personal conditions.*—Nothing of note.

(c) *Microscopic examination of the blood.*—Blood examination, second day, parasites absent: differential count as follows:—

					Per cent.
Small mononuclears	...	...	...	...	7·1
Large mononuclears	...	...	...	...	12·1
Polymorphonuclears	...	...	...	...	80·0
Eosinophiles	...	...	...	...	·8

A. G. ELDRED,
Medical Officer.

LIKULEZI. (SHIRE HIGHLANDS.)

CASE 29.

A planter. Second attack.

Previous history.—Out here two years this tour, and seven years in all.

Had been in South America before and had one attack of yellow fever.

His house is on a bad site, and swarms with anopheles. He was not a regular quinine taker.

History of present illness.—Was called to see the patient on January 6th, 1913, at Bruce Estate, Likulezi.

I was informed that the attack had commenced nine days before.

The urine was hæmoglobinuric, a good quantity was being passed; temperature 101°; respiration normal; patient anæmic; bowels constipated; liver normal; spleen much enlarged, reaching to below umbilicus. Blood examination: malaria parasites present.

Was given Hearsey's formula, and usual general treatment.

Urine cleared on 10th day; condition otherwise improved, but temperature rose every afternoon to between 101° and 102°.

Had a return of hæmoglobinuria in 3rd week, lasting twenty-four hours; after that convalescence proceeded; spleen still remained enlarged; given tonic; quinine,

5 gr., daily; complained greatly of headache, probably complicated by old fracture of vault of skull. This was second attack of blackwater in last 14 months.

Remarks.

1. *Locality*: (a) *Physical features*.—A flat tract of country close to Mlanje Mountain; not thickly wooded near house.

(b) *Occurrence of a series of cases in any one place*.—None reported.

(c) *Insect fauna*.—*A. funesta* exceedingly abundant.

(d) Few stegomyia and culex.

2. *Seasonal variation*.—Nothing of note.

3. *Personal history*: (a) *Medical history*.—Yellow fever in South America; probably had had a lot of malaria (spleen very enlarged, long standing). Not a regular quinine taker. Second attack of blackwater in 14 months.

(b) *Previous movements and personal conditions*.—Out two years, and before for four years. Careless about personal health I should imagine.

(c) *Microscopic examination of the blood*.—Blood 10th day—parasites present.

A. G. ELDRED,
Medical Officer.

MLANJE. (SHIRE HIGHLANDS.)

CASE 30.

A planter. Second attack.

Previous history.—He had been in this country for a total of seven years, with no furlough home. Before that he was one year in West Africa, and was invalided for blackwater fever. Was of regular habits, not a quinine taker. There was a history of getting wet through and not changing into dry things.

History of present illness.—This present attack commenced at 3 p.m. on February 10th, 1913. He had had fever the day before and taken 10 gr. quinine. He had been getting attacks of "low fever" for two months past. At 3 p.m. came in from his work feeling ill, with backache, and passed six ounces very dark urine. Temperature 105°, spleen +, went to bed. I saw him at 6 p.m. sweating freely. Temperature 103.5°; urine as before; condition otherwise good.

Routine treatment; continued to pass hæmoglobinuric urine till 4 a.m., when temperature fell to normal; urine became quite clear.

No further symptoms, and urine remained clear, but on the 18th day, after he had been up and about for several days, and a few hours after taking 5 gr. quinine bisulphate, the temperature rose again to 105°, and there was a recurrence of the blackwater, lasting about nine hours; the temperature then fell to normal again, and the urine cleared up, not gradually, but from one specimen deeply hæmoglobinuric to the next of amber colour.

After this a normal convalescence.

Remarks.

1. *Locality*: (a) *Physical features*.—Fairly thickly wooded country, close to Mlanje.

(b) *Occurrence of a series of cases in any one place*.—Several cases of blackwater have occurred in the immediate locality in recent years.

(c) *Insect fauna*.—*A. funesta* found. Jiggers abundant.

2. *Seasonal variation*.—Nothing of note.

3. *Personal history*: (a) *Medical history*.—Blackwater seven years ago in West Africa; had had plenty of malaria on West Coast, but says he had very little in Nyasaland until a few months ago, when he came to this locality, since when he has had many slight attacks.

He was previously living near Blantyre (3,000 feet). Spleen +.

(b) *Previous movements and personal conditions*.—Out seven years, and only out of the tropics for a few months for sixteen years.

Hardly ever takes quinine.

After working out of doors all day (occupation planter) and exposed to sun and rain.

(c) *Microscopic examination of the blood*.—Blood examined three hours after attack commenced. No parasites found.

A. G. ELDRED,
Medical Officer.

MLANJE. (SHIRE HIGHLANDS.)

CASE 31.

A planter.

1. *Locality*: (a) *Physical features*.—Fifteen miles from Mlanje Road Station; open bush country; in relation to no particular swamp.

(b) *Occurrence of a series of cases in any one place*.—The house is not a year old. It is wattle and daub.

(c) *Insect fauna*.—There appear to be plenty of mosquitoes, but as Mr. L. was an uneducated Italian it was difficult to get much information from him.

2. *Seasonal variation*.—The weather had been hot and stuffy in the middle of the rains.

3. *Personal history*: (a) *Medical history*.—The patient appears to have had much malaria whilst on the Lower River; he took quinine, but none since he came up to the highlands about a year ago (grs. 5 daily).

(b) *Previous movements and personal conditions*.—The patient has been 10 years in Africa, viz., 2 in South Africa, 7 on the Lower River (sugar plantations), and 1 in the neighbourhood of Mlanje Road. Like most of his compatriots he has lived as cheaply as he could, and therefore probably never had sufficient nourishing food. As a planter he would be much exposed to the climate.

History of the present illness.—Admitted 22nd December, 1912, discharged 15th January, 1913. He stated that he had been seized with illness (rigor) $2\frac{1}{2}$ days previously, in the evening, and passed black water. This cleared up after two days, but as he still had fever he took grs. 5 quinine when the blackwater returned.

On admission he had a jaundiced appearance. Liver and spleen slightly enlarged, and the latter tender. Pulse 88 and strong. Temperature 102° .

Put on salines, one pint, per rectum every four hours.

Dec. 23rd: His urine cleared up; evening temperature 102.4° ; condition satisfactory.

Dec. 24th: Passed 36 ounces clear urine. Temperature dropped.

Dec. 25th: Passed clear urine, but temperature 100° ; took milk and soup quite freely. Blood examined, no parasites found.

December 26th: Temperature rose in evening to 101° . Otherwise patient well and took nourishment freely: Benger, soup, and some light wine.

Dec. 27th: Given half an ounce castor oil. At 11 a.m. had a slight rigor and vomited. At 1.30 p.m. temperature rose to 103.4° and he passed 7 ounces port wine coloured urine. Salines restarted. Urine cleared up same evening. Blood taken, no parasites.

Dec. 28th: Patient well: salines continued.

Dec. 29th: Temperature rose to 104° , and he had another rigor and hæmoglobinuria returned. Blood examined, no parasites, but profound anæmia and hæmoglobinæmia.

Dec. 30th: Though I could find no parasites, determined to give quinine, grs. 6; quinine bihydrochlorate given into buttock. Some hours later temperature fell to 98° . At 3 p.m. temperature rose to 103° , and he had an attack of syncope: gr. $\frac{1}{40}$ strychnine sulphate given hypodermically and salines pushed. Later very restless, and gr. $\frac{1}{4}$ morphin. sulph. given. At 9 p.m. grs. 9 quinine given into buttock.

Dec. 31st: Patient better. Temperature between 99° and 100° ; grs. 9 again given.

Jan. 1st: Highest temperature 100° . Quinine injections continued and also salines.

Jan. 2nd: From now on patient made a gradual but complete and uninterrupted recovery and was discharged on the 15th.

A. H. BARCLAY,
Medical Officer.

ZOMBA. (SHIRE HIGHLANDS.)

CASE 32.

A planter, aged 34, living 10 miles from Zomba.

1. *Locality*: (a) *Physical features* of country the same as reported in case reported last year.

(b) *Occurrence of a series of cases in any one place*.—The case reported last year came from the same district about 7 miles further from Zomba.

(c) *Insect fauna* as recorded last year.

2. *Seasonal variation*.—No unusual climatic conditions.

3. *Personal history*.—

(a) *Medical history*; and (b) *Previous movements and personal conditions*.—Patient had been in the country for some seven years, had had dysentery in South Africa before coming to Nyasaland, and amœbic hepatitis in this country, cured by ipecacuanha, some five years ago. Since then he had had "fever" from time to time and had had indifferent health for many months, chiefly complaining of digestive troubles.

No history of syphilis, but $C_2H_5(OH)$ in some excess.

He lived in a temporary grass house without efficient protection from mosquitoes.

Irregular taker of quinine. Previous attack unknown. During the three weeks immediately preceding the blackwater the patient had had rises of temperature in the evening, headache and loss of appetite, with epigastric pain and nausea, relieved sometimes by vomiting, also diarrhœa with watery non-offensive motions without blood or mucus. He had taken 3-5 grains of quinine per diem in form of sulphate, as sugar-coated tabloids.

Symptoms more marked during three days preceding attack, and nothing had been taken by mouth except soda-water.

The day before onset of blackwater fever he complained of right hemi-anæsthesia with burning sensations in hands and feet lasting some hours. At 9 p.m. on July 13th, 1912, he was more comfortable; temperature 99.6° F., pulse 80, fair; a little tenderness in epigastric region. No enlargement of spleen.

Systolic murmur at apex: patient thin and anæmic. Seen by me on this date.

Blood showed no malarial parasites and no evidence of malaria.

One hour later without further symptoms patient passed "black water" and within a short time icterus was apparent. Admitted to Zomba Hospital at 1 a.m., 14th instant. On admission, marked icterus; signs of dilatation of heart more marked, no abdominal signs or symptoms. Temperature 100.4° F. Pulse 88.

Urine.—1005 sp. gr.; albumin 20; of slightly brownish colour, spectroscopically showing presence of methæmoglobin; guaiacum test positive; microscopically no blood cells, no casts; a little granular debris present.

Blood.—Anæmia marked. No malarial or other parasites.

Progress of case.—By mid-day on the 13th the urine was clear of hæmoglobin. Patient taking fluid well and urine passed freely. Temperature fallen to normal.

In the succeeding six days until death, patient went gradually downhill. The anæmia was rapidly progressive, a drop of blood was almost colourless. Red cells estimated at 1,000,000; microscopically they appeared as irregularly-shaped bodies hardly staining at all, with many "ghost" forms. Leucocytosis developed but no malarial or other parasites were seen. Urine remained clear of hæmoglobin but contained a small amount of albumin; passed in large quantities, 51, 74, 90, 79, 63, 130, 92, 70 ounces being passed on successive days. Patient sleepless and restless; complained of throbbing in head and intense feeling of weakness. He "wandered" at night.

Nourishment and liquids were well taken all along. On the day before death the spleen became palpable. The temperature, which had risen after the first fall to normal, remained between 100° and 101° F.

Treatment.—15th: mustard leaf to epigastrium to relieve vomiting.

16th: Morphine and atropine injected to ensure rest; repeated on the 18th; water and soda given freely by mouth and, later, intravenous saline. An attempt at transfusion was made but found to be impossible, owing to lack of apparatus. Strychnine and digitalin were used for the heart failure. Cascara given as necessary to open bowels, followed by *sod. sulph.* Milk, chicken-tea, arrow-root, Benger's Food constituted nourishment given.

Remarks.—A typical history previous to attack of blackwater—irregular "fever," irregular quinine taker—in a man not living under good conditions. The actual

blackwater was of short duration, but the hæmolysis was progressive and death was due to actual loss of blood substance.

Fluids were well taken by mouth and amount of urine kept "up," so that there was no indication for treatment except transfusion, which was impossible.

The failure to find malarial parasites in the peripheral blood one hour before onset of blackwater is noteworthy.

H. S. STANNUS,
Medical Officer.

MPIMBI. (UPPER SHIRE.)

CASE 33.

A planter, aet. 25 years, living at Mpimbi, on the mid-Shire River, 25 miles from Zomba.

1. *Locality*: (a) *Physical features*.—Low-lying country in the Shire plain; marshes; very hot.

(b) *Occurrence of a series of cases in any one place*.—I do not know of other cases from neighbourhood lately, but believe there were others in past years.

(c) *Insect fauna*.—Not known to me by personal observation; mosquitoes numerous.

2. *Seasonal variation*.—I have no personal knowledge.

3. *Personal history*: (a) *Medical history*; and (b) *Previous movements and personal conditions*.—The patient was brought into Zomba hospital in a serious condition and previous movements were not elicited in great detail.

Previous history.—He had returned from England to his employment on a cotton estate nine months before, and during this period had been in the habit of taking 10 grains of quinine sulphate in tabloid form each Wednesday and Thursday. About a month before the blackwater, however, he had an attack of "fever," but did not take any extra quinine. He had never had blackwater fever before, and was of temperate habits, being a total abstainer and non-smoker.

I think, however, he was probably not very particular in protection against mosquitoes.

History of present illness.—On the previous Wednesday and Thursday he had taken his usual doses of quinine; on the Friday he felt very well, but on Saturday, November 3rd, he felt feverish and took 10 grains of phenacetin, followed an hour later by 10 grains of tabloid quinine sulphate. Half-an-hour later (11.30 a.m.), blackwater appeared accompanied by rigor, icterus, vomiting and diarrhoea.

He remained on the plantation till the night, and was then carried 25 miles in a hammock and admitted to Zomba Hospital on the 4th at 11.30 a.m., not having passed any urine for two or three hours.

On admission—temperature 100.6° F., pulse 108, respiration 15; a man of good physique, icterus marked. No signs in chest or abdomen except heart-beat rather of a tic-tac rhythm; vomiting and diarrhoea troublesome. A catheter passed found the bladder absolutely empty.

Treatment.—Mustard leaf to epigastrium, starch and opium enemata to relieve abdominal symptoms. Eight ounces of fluid containing 30 grains of sodium bicarbonate every hour by mouth, saline under the skin, cupping over the loins and digitalis without relief of the suppression.

On the arrival of assistance, forty-eight hours after the establishment of suppression, I performed right nephrotomy, under chloroform anaesthesia, by the usual loin route, splitting the tense capsule from pole to pole and incising the bulging gray kidney along the middle of the free border. The patient's condition was satisfactory after the operation but necessitated an injection of morphia for restlessness. On the following day it was found there had been free oozing from the wound, and twelve ounces of brown fluid containing brown granular matter were withdrawn from the bladder.

During the remaining three and a-half days till death, small amounts of urine were passed naturally or drawn off by catheter, but the general condition progressed unfavourably.

Urine measurements in ounces:—November 3rd, 0; 4th, 0; 5th, 4½; 6th, 1; 7th, 2½; 8th, 2½; 9th, ½. Flatulence, abdominal distension and hiccough were

troublesome, and diarrhœa recommenced. The temperature rose again on the 6th; there was œdema of the face and increasing signs of heart failure. Symptomatic treatment and intravenous saline given.

On the 9th there was a series of uræmic seizures, followed by coma and death.

Microscopic examination of the blood.—On admission and subsequently no malarial or other parasites were found in the peripheral blood.

Remarks.—This is the first case of early suppression in blackwater fever I have seen, and though operative measures after the failure of other means were followed by a fatal termination, the facts of the case warrant the inclusion of nephrotomy among the modes of treatment of suppression. It is a method which, I think, is warranted by the known underlying pathological conditions, but in my own case carried out too late.

H. S. STANNUS,
Medical Officer.

FORT JOHNSTON. (SOUTH OF LAKE NYASA.)

CASE 34.

Aged 47; was admitted to Fort Johnston Hospital on September 9th, 1912, and discharged on September 21st, 1912.

Previous history.—Patient had been about four years in the Nyasaland Protectorate, but had lived for a considerable number of years in tropical countries. He had typhoid fever in Queensland and also malaria in that country.

He had five attacks of malaria since coming to Nyasaland. For the first two years of his residence in this country he was in the habit of taking 10 grains of quinine daily; since then, however, he had only taken it when he felt attacks of fever coming on. Some history of $C_2H_5(OH)$.

History of present illness.—Patient went to Blantyre ten days before onset of attack, and when there, not feeling well, was given a hypodermic injection of quinine.

He returned to Fort Johnston three days before onset of attack still feeling out of sorts.

During the morning of September 8th he felt ill and vomited, but continued to go about all day; in the evening he took ten grains of phenacetin and ten grains of quinine. About midnight he had a rigor, and during the morning of the 9th took another ten grains of quinine. At midday on the 9th he had another rigor, and, soon after, his wife noticed his urine was dark and sent for the Medical Officer. He was then admitted to hospital, his temperature being 104.2° F. and his urine typically hæmoglobinuric.

Patient, a big strong man, complained chiefly of headache and vomiting and retching. He had no lumbar or hypogastric pain. He was extremely restless. His spleen was not palpably enlarged, but his liver came about half-an-inch below the costal margin in the nipple line. There was no abdominal tenderness. Some epigastric pain and tenderness developed later on from the persistent vomiting and retching.

On the morning after admission, about 16 hours after the onset of the "blackwater," blood slides were taken and examined, but no parasites of any sort were detected.

Patient had been constipated for some time previously. Vomiting was persistent for first three days and recurred from time to time until after the patient left hospital.

The treatment adopted was purely symptomatic, the vomiting being the most distressing persistent symptom; for this, *sodii bicarb.* in 15 grs. doses was given two-hourly, then *tinct. iodi* in m 11 doses quarter-hourly; *acid. hydrocya. dil.* in m 6 doses hourly, and sips of champagne were tried. None of these drugs seemed to have the slightest effect.

The constipation was relieved by enemata.

The restlessness at night was found to be relieved by 20 grs. doses of trional.

Mustard plasters were used for the epigastric pain following the retching and met with some success.

Saline rectal injections were regularly administered, about eight ounces being given every four hours.

After admission, patient had one rigor, about noon, on the second day of the disease.

The urine became apparently free from hæmoglobin on the fourth day of the illness.

The amount of urine passed was as follows:—

1st day, 8 ozs.

2nd „ 6 „

3rd „ 9½ „

4th „ 15 „ after which it increased regularly.

When patient left hospital, at his own request, he was still very weak, and from time to time for about a fortnight afterwards was troubled by headaches, probably due to anæmia, and occasional vomiting attacks.

Great difficulty was experienced during his convalescence in getting him to take sufficient nourishment.

The gastric irritability and distaste for milk, &c., may, in a great measure, be attributed to his habits.

Remarks.

Locality: (a) Physical features.—Fort Johnston is situated on the bank of the Upper Shire River, about 6 miles south of Lake Nyasa, on a sand bank somewhat higher than the surrounding river bank. The houses are about 20 to 30 feet above river level according to the season and consequent height of the water level. The subsoil is sandy and permeable.

The surrounding bush consists chiefly of large and small palm trees; no very dense bush or large forest in the immediate neighbourhood. No large swamps close by, but there is weedy and swampy ground just across the river.

(b) Occurrence of a series of cases in any one place.—There have been no series of cases of blackwater fever in the locality lately.

(c) Insect fauna.—Biting flies of many sorts are numerous in the locality—*Tabanidæ*, *Stomoxys*, *Culicidæ*, *Anophelinæ*, &c.

The tick *Ornithodoros moubata* is also common in native dwellings near the township.

The subject of the present report states that before settling in Fort Johnston, while prospecting through Nyasaland, he was frequently much bitten by tsetse fly.

Seasonal variation.—There were no unusual conditions for the locality and time of year.

R. BURY.

Medical Officer.

EAST AFRICA PROTECTORATE.

Station or Place.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Race of Patient.	Mode of termination of case.
Voi	—	—	—	—	—	1	—	—	—	—	—	—	European	Recovery.
Ngabotok	1	1	—	—	—	—	—	—	—	—	—	—	African ...	Death.
Mumias	—	—	—	—	—	—	—	—	1	—	—	—	Goan ...	Death.
Kisii	—	—	—	1	—	—	—	—	—	—	—	—	Goan ...	Recovery.
Kwaratek River Camp; Trans-Nzoia.	—	—	—	—	—	—	1	—	—	—	—	—	European	Death.

The above table sets forth the recorded distribution of blackwater fever in regard to time and place, together with certain other details for the year 1912. Of the total number two were Europeans, two Asiatics, and two Africans. In respect of professional attendance one case was seen by a medical man, four by junior members of the department, and one by laymen. All the patients were males.

1. *Locality. (a) Physical features.*—So far as locality is concerned, Kisii and

the Kwaratek River Camp have an altitude each of over 5,000 feet, while Voi, Ngabotok, and Mumias lie at lower levels.

Kisii, though in high country (5,700 feet, approximately), is not far from the lower altitudes surrounding the Victoria Nyanza and tracks provide means of communication between it and the lake.

The Kwaratek River Camp has an elevation of 6,100 feet and is situated on a low ridge near swampy ground at the junction of the trade route between Abyssinia and Mumias with the river in question.

Mumias, with an altitude of some 4,500 feet, is situated on a small hill in a thickly populated country and surrounded by rivers.

Voi (1,830 feet) is situated in bush country, a swamp existing close to the camp whereat one of the cases occurred.

Ngabotok (2,400 feet) is an outlying station to the south-west of Lake Rudolph. It is situated on the top of a small hill about 1,500 yards from the Turkwell River. The surrounding country is open thorn bush on sandy soil, except near the river itself, where there is a well-defined belt of vegetation consisting of large trees and dense undergrowth varying from 200 to 400 yards in width. When travelling in the district water is usually obtained from water holes or hot springs as the Kerio and Turkwell are the only rivers that flow. These water holes are often polluted owing to the number of stock watered at them.

All these localities, except that of the Kwaratek River Camp, are classed as unhealthy.

(b) *Occurrence of a series of cases in any one place*.—None of the cases reported, so far as is known, forms part of a series. The disease has, however, before now manifested itself at Mumias, Voi, and Ngabotok.

(c) *Insect fauna*.—In view of the nature of their employment, it can, I think, be safely assumed that all of the persons under review in this report as having suffered from blackwater fever have been exposed to the attacks of mosquitoes. One was a surveyor, one an engineer, one a trader, one an agent of a trading firm, and two native soldiers.

Anophelines and tabanids have been found in the Voi and Mumias regions, and mosquitoes—some of them with spotted wings—are stated to exist in the country through which the Kwaratek flows. As to Ngabotok, while the results of investigation at one period of the year would seem to have failed to secure any specimens of Culicidæ either in the station itself or close to the river (although one was heard at the former place) yet, towards the close of 1912, it is asserted that they were very plentiful. Tsetse fly are present on the Turkwell River.

No information is available to hand concerning the insect fauna of *Kisii*.

2. *Seasonal variation*.—Four of the cases occurred in the cool season of the year, *i.e.*, between the months of April and September, at the commencement of which period the heavy rains usually set in.

3. *Personal history*. (a) *Medical history*.—In four of the patients previous attacks of malaria are stated to have occurred, and, of this number, but one would appear to have attempted prophylaxis and that in an inefficient manner.

No information is available regarding the previous history of the remaining two of the total. So far as the Europeans are concerned, one had had a little over four years' service in the country and the other but six months'. There is no record of previous hæmoglobinuric manifestations having been observed in any of the cases.

(b) *Previous movements and personal conditions*.—At the time of the onset of their illnesses two of the sufferers (Europeans) were engaged in out-door work and living in camp. A native servant of one of them is stated to have coincidentally developed an illness which was characterised by vomiting and the passage of blood in the urine. The remaining patients were in residence at their respective stations when overtaken by the disease.

(c) *Microscopic examination of the blood*.—In blood smears taken from one of the patients malaria parasites (rings) were found on the sixth and seventh days of the illness, and, in those taken from a second, none were found. No record is available to show that blood examinations were made in the remaining cases.

From a consideration of the information available in regard to the cases which are the subject of this report it would appear that the patients—

- (1) followed occupations which rendered them specially liable to exposure to malarial infection,

and that the majority of them

(2) have no record of having taken quinine systematically,

(3) had had attacks of malaria prior to the development of blackwater, and

(4) manifested the disease in localities rated as unhealthy.

In conclusion I have the honour to enclose herewith the report of the Voi case, made by the Senior Medical Officer, European Hospital, Mombasa, under whose care the patient came on admission to that institution.

J. HARAN,
Acting Principal Medical Officer.

CASE 35.

Railway Engineer, aged 25. *Residence in country*: 6 months.

1. *Locality*: (a) *Physical features*.—Voi, situated on a stream of the same name under the Ndara Hills, elevation 1,830 feet, at a distance of 103 miles from the coast. General character of country is bush, but with a large swampy area close to the site of the patient's camp. This was generally stationary, but occasionally moved to accommodate the necessities of his work, viz., engineer-in-charge of a new water-supply for the township.

(b) *Occurrence of a series of cases in any one place*.—His tent was situated in places immediately associated with numbers of native and Indian workmen, his food supply could not be described as good in quality, or capable of much variety, unless he dined at the Dâk Bungalow, situated about 2 miles away, necessitating travelling in a railway trolley at all seasons. He appears to have led an austere life, and there is absolutely no reason to suppose that he had any intercourse with native women.

It may here be said that the locality is known to be very unhealthy, and its reputation for malaria is most unenviable. Many cases contracted there have come under my own observation, as well as one other case of blackwater.

(c) *Insect fauna*.—Among others the following insects are known: Anophelinæ, Tabanids, *Glossina fusca*, *austeni*, *longipennis*, etc.

2. *Seasonal variation*.—The rainfall is practically identical with that of the coast, i.e., March-May and October-January. Average for the year: 18 to 22 inches. Occasionally the district is visited by severe thunderstorms, and large tracts of surrounding country inundated.

3. *Personal history*: (a) *Medical history*.—Patient had no experience of tropical countries prior to his appointment here; his general health appears to have been excellent; he had taken systematically 5 gr. of the sulphate of quinine since his advent at Voi, once a week, and more during his attacks of malaria, of which there appear to have been three recorded, one necessitating his removal to Nairobi for a period of ten days. His history of malaria on admission contains these words. "I have had fever on or off for months"; and, having regard to the fact that his attack of blackwater supervened within six months of his arrival in the country, it can be assumed that his first infection of malaria occurred soon after his arrival, when he was immediately stationed at Voi.

(b) *Previous movements and personal conditions*.—The conditions of life to which he was subjected were those obtaining in a construction camp—tent life, rough-and-ready conveniences, food none too good or regular—but he took the precautions of sleeping under a mosquito-net and boiling his drinking-water. That he was unduly exposed to malaria infection cannot be questioned, as the nature of his work and his own zeal called him out into the district at all hours.

Present attack.—Came under observation on June 25th, and was brought into hospital at 8.30 a.m. with a history of six days' illness, ushered in by vomiting, rigors, and headache. He did not know his temperature limit; on the 20th he noticed his urine was port wine coloured, and did not remember anything for some days; he was found on the 24th, by the Permanent-Way Inspector, ill, and brought into hospital.

On admission.—Very anæmic, herpes on lower lip, slight jaundice, complained of headache and pain in the back, very restless, much thirst.

A blood examination showed crenation of the blood corpuscles, some malaria (ring) parasites. No blood count was made. The pulse rate was from 84 to 104;

the respirations 28 to the minute. The spleen could not be felt. Twenty-eight and a half ounces of a dark, smoky albumen were passed during the twenty-four hours. At 7 p.m. there was a rigor, during which the temperature rose to 102.6° . The urine now became very dark (porter coloured) and the jaundice increased. There was no vomiting. Absolute rest in bed was prescribed and large quantities of fluid were given during the day. Potassium bicarbonate and the *liquor hydrarg. perchloridi* were given, and after the rigor an effervescing mixture containing quinine (gr. 5) was given twice a day.

During the night the urine was darker but not as thick. The patient did not sleep at all.

June 26th : The temperature fell to normal at daybreak. During the day the pulse varied between 88 and 120 beats to the minute; in character it was unsatisfactory. The urine cleared a little, but the general condition of the patient did not improve; he was very restless; there was much dyspnœa and pain in the loins and thighs. A further examination of the blood showed an increased number of malaria ring parasites. Quinine, grs. 30, every twenty-four hours was prescribed. Twenty-seven and a half ounces of urine were passed during the twenty-four hours.

June 27th : The temperature fell to normal in the morning after a good sleep. The urine became clearer. At 7.45 p.m. the patient had a severe rigor, which was followed by the passage, immediately afterwards, of very dark urine. Before the shivering fit had quite subsided the patient was given a hypodermic injection of quinine, grs. 10. The total amount of urine passed during the twenty-four hours was fifty-one ounces.

He had a good night.

On June 28th he was better. The hypodermic injection of quinine, grs. 10, was repeated. The temperature rose to 99.2° . The urine was now clearing.

He again passed a good night.

On June 29th he was better. The hypodermic injection of quinine, grs. 10, was repeated, and two doses of an effervescing mixture of quinine (grs. 10) were given by the mouth. The diet was increased. The pulse-rate was from 68-80, and the temperature rose to 99.8° , dropping to subnormal at night.

June 30th : From now onwards the patient made an uninterrupted recovery. He was convalescent, and was given tonics.

July 13th : He was now allowed to sit out in the verandah. The urine was normal, and of better colour. It contained a few white urates.

July 17th : The patient was discharged from hospital.

Remarks.

As appears, this case was treated as a double tertian infection with hypodermic injection of quinine, in spite of the fact that hæmoglobinuria was present, and that the patient was in a most critical condition.

The presence of rings and pigments in the corpuscles, and the daily varying range of the temperature, indicated the lines on which the treatment was to be directed, and, as it appears, with the happiest result.

Dr. Haran, C.M.G., also saw the case, and agreed that the condition was one calling for the energetic treatment that was adopted; and in the course of a long experience in malaria and its many evidences, I cannot recall any case which called so clearly for a definite course of treatment, unless it be those of so-called dysentery coming from the same district, which yielded in the same manner to the hypodermic exhibition of the hydrochlorate of quinine.

On reviewing the history of the case it will be noticed that within twenty-four hours of admission quinine in small doses was given by the mouth, and pushed until 30 grs. daily were so taken on the third day as well as the hypodermic dose.

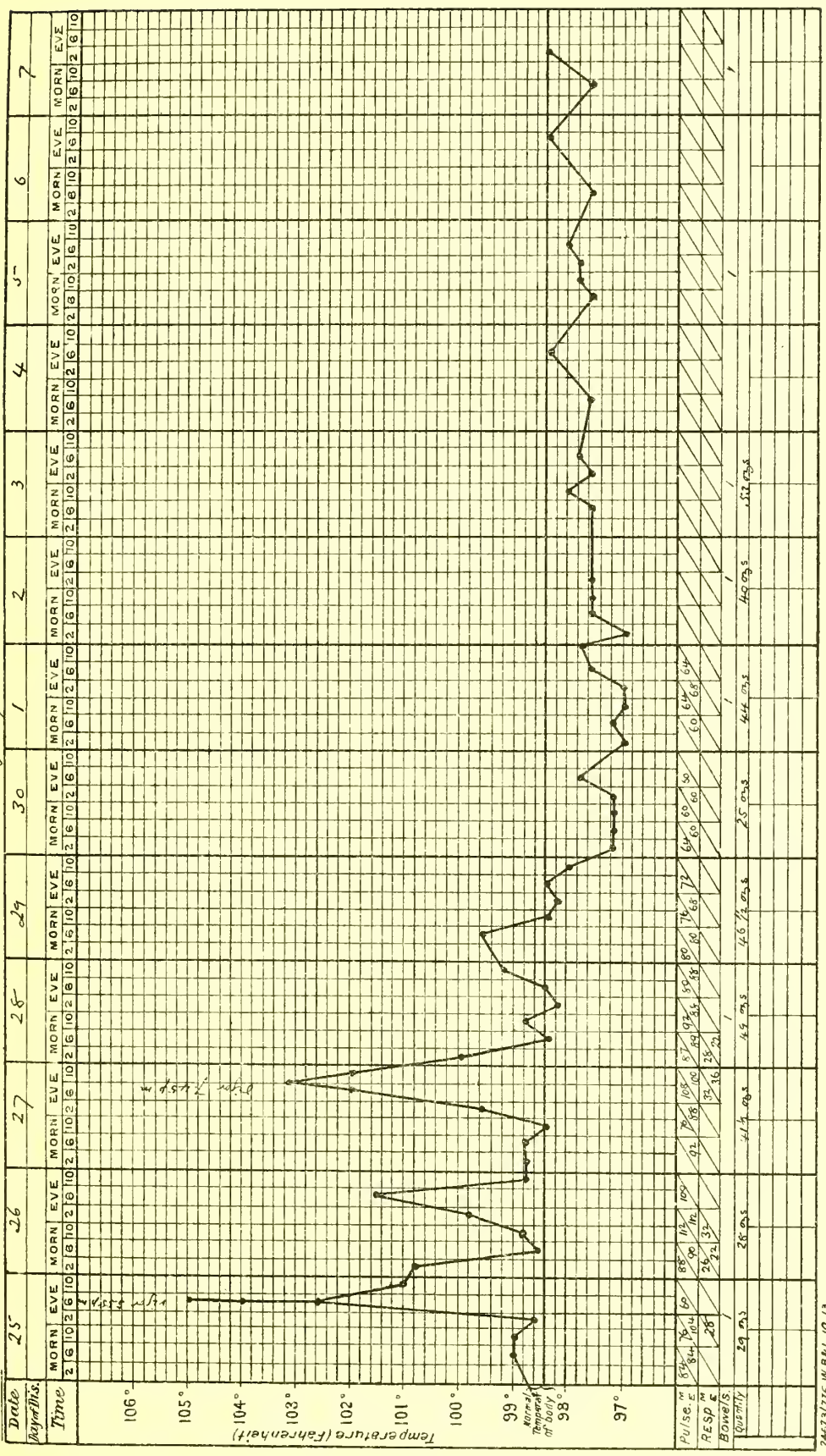
The defining factor in the case was the presence of rings and pigment in the corpuscles, demonstrable from the first, and, indeed, persisting until the first hypodermic injection, after which no trace could be found in any specimen drawn from the peripheral blood.

It is a point of interest that the recognition of the rings was confirmed by the bacteriologist, Dr. Ross, whose opinion was not received until long after the treatment was decided on and applied, on account of the distance between the coast and Nairobi.

June

July

CASE 35.



24023/76.W.B.L.10/13



URINE QUANTITY.

Case 35.	Time.				Quantity.	Total.	Total, twenty-four hours.
					Ounces.	Ounces.	Ounces.
June 25th, 1912	8.45 a.m.	...	...	...	1 $\frac{1}{2}$		
	2.0 p.m.	...	...	...	3 $\frac{1}{2}$		
	4.0 "	...	...	...	5 $\frac{1}{2}$		
	6.30 "	...	...	...	4	14 $\frac{1}{2}$	
June 26th, 1912	9.0 p.m.	...	...	...	8		
	12.0 "	...	...	...	7	15	29 $\frac{1}{2}$
	2.50 a.m.	...	...	...	7 $\frac{1}{2}$		
	6.0 "	...	...	...	8		
June 27th, 1912	12.0 "	...	...	...	6	21 $\frac{1}{2}$	
	4.0 p.m.	...	...	...	6 $\frac{1}{2}$	6 $\frac{1}{2}$	28
	4.0 a.m.	...	...	...	13		
	6.0 "	...	...	...	8		
June 28th, 1912	8.0 "	...	...	...	6		
	11.55 "	...	...	...	7	34	
	2.30 p.m.	...	...	...	6		
	4.0 "	...	...	...	7		
June 29th, 1912	7.30 "	...	...	...	4 $\frac{1}{2}$		
	10.0 "	...	...	...	4	17 $\frac{1}{2}$	51 $\frac{1}{2}$
	12.30 a.m.	...	...	...	7 $\frac{1}{2}$		
	2.30 "	...	...	...	8		
June 30th, 1912	5.45 "	...	...	...	8		
	9.0 "	...	...	...	4		
	11.0 "	...	...	...	4 $\frac{1}{2}$	32	
	4.0 p.m.	...	...	...	8		
July 1st, 1912	10.0 "	...	...	...	9	17	49
	4.0 a.m.	...	...	...	13		
	7.30 "	...	...	...	7 $\frac{1}{2}$		
	11.50 "	...	...	...	12	32 $\frac{1}{2}$	
July 2nd, 1912	3.30 p.m.	...	...	...	8		
	6.30 "	...	...	...	7		
	12.0 midnight	...	...	...	9	24	56 $\frac{1}{2}$
	5.30 a.m.	...	...	...	8		
July 3rd, 1912	12.0 noon	...	...	...	5	13	
	4.0 p.m.	...	...	...	7		
	6.0 "	...	...	...	5	12	25
	3.0 a.m.	...	...	...	10		
July 4th, 1912	6.0 "	...	...	...	4		
	9.15 "	...	...	...	9	23	
	2.0 p.m.	...	...	...	8		
	4.0 "	...	...	...	1		
July 5th, 1912	11.50 "	...	...	...	12	21	44
	6.0 a.m.	...	...	...	12		
	12.0 noon	...	...	...	13	25	
	6.0 p.m.	...	...	...	9		
July 6th, 1912	11.50 p.m.	...	...	...	16	25	50

GOLD COAST.

The Principal Medical Officer, in forwarding the report, states :—

" I have the honour to submit, in triplicate, reports on the cases of blackwater fever, which were brought to my notice during the year by the members of the West African Medical Staff serving in this Colony.

" In many details they are far from being complete, which I regret, but it is

to be explained by the reports being called for originally (by Circular, March, 1911) at the end of each year and not at the time the cases occur.

"Medical officers are continually changing owing to leave and invalidings; thus it came about that the officers who actually attended the cases did not write the reports.

"This, I may state, has now been altered, and I trust for the future the reports will be strictly in accordance with the instructions as laid down in circular despatch from the Secretary of State, of January 24th, 1911.

"Excluding the mines, from which I have no details, thirteen cases occurred in the Colony, Ashanti, and Northern Territories.

Towns.	No. of cases.	Nationality.	Deaths.
Accra	1	Syrian.	1
Cape Coast	1	British.	1
Saltpond	1	"	0
Seccondee	3	2 British, 1 West Indian.	1 British 0
Axim	2	2 British.	2
Quittah	1	"	0
Akuse	1	Mulatto.	1
Dunkwa	1	British.	0
Ejura (Ashanti)	1	"	0
Wa (Northern Territories)	1	"	0
	13	British 10 West Indian 1 Mulatto 1 Syrian 1	British 4 Mulatto 1 Syrian 1

Officials : 6.

Non-officials : 5.

Syrian and Native : 2.

"No details are available in the case of the mulatto and Syrian in the Colony, or the official, a sapper, in Ashanti, as he had not medical attention until convalescent."

CAPE COAST.

CASE 36.

European Merchant.

No clinical notes available. The case was a fatal one.

1. *Locality*: (a) *Physical features*.—The patient arrived in Cape Coast from Accra on the 8th February. In Accra, the quarters occupied by him for at least a month before the attack of blackwater were in the African Association factory facing the main road, and in close proximity to native habitations on three sides. It was in this locality that an outbreak of yellow fever occurred in June, 1911.

(b) *Occurrence of a series of cases in any one place*.—No other cases of blackwater fever to my knowledge in that locality, at or previous to the time in question.

(c) *Insect fauna*.—An abundance of mosquitoes, numerous breeding-places of stegomyia. No details known.

2. *Seasonal variation*: *Unusual climatic conditions*.—Early February. No rains. Best and healthiest season of year.

3. *Personal history*: (a) *Previous history*.—The patient was invalided to England at end of last tour. He was then thought to be suffering from a disease of the blood (Hodgkin's disease). He returned to this Colony in October, 1911. Not a constant quinine-taker. He took occasionally when he felt out of sorts. For a month previous to last illness he suffered frequently from malaria, hardly a day without a temperature; not under treatment; took quinine, 10 or 15 grains, occasionally.

(b) *Previous movements and conditions to which patient has been subject*.—Left Accra about 6th February by small branch boat. States that he caught a chill on the boat.

(c) *Microscopic examination of the blood*.—No parasites.

C. V. LE FANU,
Medical Officer.

SALTPOND.

CASE 37.

European Merchant.

History of present illness.—The patient, an agent for one of the business firms at Saltpond, sent for his medical attendant on the night of 28th July. He stated that he had been suffering from attacks of fever, and that he had been losing weight and strength for the past few months. He was very jaundiced, and his tongue was very dirty. His temperature was 104° and pulse 120. Two blood smears were taken. Five grains of calomel followed by a dose of magnesium sulphate were prescribed. Blood examination showed a severe infection with sub-tertian parasites.

Ten grains of quinine bi-hydrochloride were given intermuscularly on the morning of the 29th, and repeated in the afternoon.

July 29th.—Temperature 101° , pulse 120. He stated that the calomel had acted three times. The temperature in the afternoon was 100° .

July 30th.—Temperature normal. No parasites were found on examination. Ten grains of quinine were given intermuscularly. The patient was advised to take five grains of quinine daily, and to try to manage to get home for a change.

August 1st.—I was sent for urgently this morning to see the patient. He complained of vomiting, headache, pains in the back; and stated that his water was very dark in colour. Temperature 104° , pulse 100.

Blood examination :—

- (a) Parasites, nil.
- (b) Lymphocytes, 15·3 per cent.
- (c) Large mononuclears, 18·5 per cent.
- (d) Polymorphonuclears, 65 per cent.
- (e) Eosinophiles, 2·4 per cent.

Urine :—

- (a) Dark, looking like porter.
- (b) Alkaline in reaction.
- (c) Sp. gr. 1014.
- (d) Spectroscopic absorption bands of oxy-hæmoglobin.

August 1st.—10 a.m.; both Plehn's and Christopher's reactions were present. The patient was placed at once on the Hearsey treatment, and advised to drink as much barley water as he could possibly manage; milk and Perrier water diet. 5 p.m.: temperature 103° , pulse 103. He stated that he felt very comfortable. Passed about ten ounces of urine of an intensely black colour. 10 p.m.: patient sleeping soundly.

August 2nd.—8 a.m.; patient stated that he slept very poorly. Temperature 102° , pulse 100. Patient passed nearly twenty ounces of urine, very dark in colour. Treatment continued. 9 p.m.: He stated that he slept during the afternoon. Temperature 100° , pulse 90, he passed about forty ounces of urine; this was much lighter in colour than that passed in the morning.

August 3rd.—7 a.m.: He stated that he slept all night. Temperature normal, pulse 76; passed about twenty ounces of urine, which was almost clear in colour. The treatment was continued. 5 p.m.: temperature normal. He was now passing large quantities of very pale-coloured urine.

August 4th.—7 a.m.: temperature normal. Urine normal in colour. Hearsey treatment discontinued. Patient placed on chicken diet. Patient had a relapse at 9 p.m. this evening, starting with a severe rigor. 10 p.m.: temperature 104° , passed about six ounces of very dark coloured urine. The former treatment was commenced immediately.

August 5th.—6 a.m.: temperature 100° , pulse 90. Patient passed about ten ounces of urine of a dark colour. Blood examination: no parasites found.

9 p.m.: temperature 99° . Patient passed about thirty ounces of urine almost clear in colour; treatment continued.

August 7th.—9 a.m.: temperature normal; urine light and clear in colour; treatment continued. 5 p.m.: temperature normal; urine normal.

August 8th.—Temperature normal, treatment discontinued. Patient placed on iron and arsenic tonic. Patient strictly warned on no account to get out of bed, and to make arrangements with his firm to be relieved at earliest possible date with a view to proceeding to England.

August 9th.—2 p.m.: patient, who, it seems, spent the morning with his clerk going over accounts books, was seized with fainting fit about 1 o'clock. His pulse was 120, and very irregular. Heart sounds weak and irregular. A hypodermic injection of strychnine was given, and patient warned to keep perfectly quiet. A mixture of digitalis and strychnine was prescribed, and a couple of ounces of brandy, all to be taken in twenty-four hours.

August 10th.—Patient stated that he felt all right again, but was very weak.

August 11th.—Patient getting on well. Temperature normal, pulse normal.

August 12th.—Patient convalescent, and is proceeding home on the 15th.

August 14th.—Proceeding to Cape Coast by hammock with patient.

Remarks.

1. (a) *Locality*.—The bungalow is skirted by a range of hills covered with low, thick bush, which comes almost right up to the compound at the rear. For three months of the year (during the rains) the whole of the ground at the rear of the bungalow is under water.

N.B.—For the past three months a considerable amount of bush clearing has been done by the sanitary squad in this locality.

(b) *Prevalence of the disease*.—No other case has occurred here for the past six years.

(c) *Insect fauna*.

(a) *Mosquitoes*. *Anopheles*.—Both *Myzomyia funesta* and *Pyretophorus costalis* have been found in the locality, but are in the whole rare. The two commonest species found here are *Mansoni uniformis* and *Stegomyia fasciata*, the former constituting 70 per cent.

(b) *Biting flies*.—Most of the blood-sucking muscidæ are represented in this locality—*Chrysops*, *Stomoxys*, and *Glossina morsitans*; of these *G. morsitans* is the commonest.

Both bugs, fleas, and lice are extremely common amongst Kroo-boys employed here by the traders, the commonest being *Pulex irritans* and *Phthirius inguinalis*.

2. *Seasonal variation*.—Usual climatic conditions. Rainy season from June to September with occasional tornadoes.

3. *Personal history*: (a) *Medical history*.—Patient served twelve years on the coast both in Southern Nigeria and Gold Coast. Had an occasional "go" of fever. Took quinine pretty regularly. Temperate in his habits.

(b) *Previous movements*.—Patient spent the previous year in this station with the exception of a few occasional visits to Appam, Winnebah, and Accra in connection with his business.

(c) *Microscopic examination of the blood*.—On the morning of the attack there was a severe infection of sub-tertian parasites, but, on making a subsequent examination twelve hours after, no parasites could be found in the peripheral blood.

Parasites. Severe sub-tertian infection:—

	Per cent.
Lymphocytes	17.6
Large mononuclears	20.5
Polymorphonuclears	65.0
Eosinophiles	1.8

Although careful search was made, no cell inclusions were found, although the writer had an opportunity of examining Sir William Leishman's original specimens.

D. J. F. O'DONOGHUE,
Medical Officer.

SECCONDEE.

CASE 38.

Gold Coast Constabulary.

A West Indian official. He had his first attack of blackwater fever in Tarkwa, April, 1906. He had then been out twelve months of his second tour. He did not remember having any attack of remittent fever before this. Had not been taking quinine. After convalescence was transferred from Tarkwa to Cape Coast.

Remained there nineteen months, till November, 1907; then transferred to Secondee, and went home to the West Indies six months after. Remembered an attack of blackwater fever in Dunkwa before going home, but it was a slight one. Was on leave eight months and returned in March, 1911.

Had a third attack blackwater fever in October, 1912. Had no attack of remittent fever before this, and had not taken any quinine. Was invalided six weeks to the Canary Islands, and had since been taking quinine bisulphate, gr. 5, every other morning.

Had dysentery in October, 1904.

Remarks.

1. *Locality: (a) Physical features.*—Secondee, a large town on the sea coast.
- (b) *Occurrence of a series of cases in any one place.*—Three cases occurred during 1912. One in January, one in October, and one in December. Cases occurred in different parts of the town. Lived in close proximity to native town.
- (c) *Insect fauna.*—Mosquitoes—*stegomyia* and *anopheles*.
2. *Seasonal variation.*—Cases occurred during dry season.
3. *Personal history: (a) Medical history.*—This is his third attack of blackwater fever. He was not in the habit of taking quinine.
- (b) *Previous movements and personal conditions.*—Stationed in Secondee for some time. Lives very carefully.
- (c) *Microscopic examination of the blood.*—Not available.

E. W. GRAHAM,

Senior Medical Officer.

CASE 39.

European—non-official.

He was admitted on 31st January, 1913, and discharged on 14th February, 1912. No record of his illness had been kept. He appears to have been a derelict. He had been taken on temporarily by the railway, but the railway would take no responsibility for his hospital fees, and he is signed on the hospital books as a pauper. Of his previous history there is no record. I have no doubt he had been in some privation previous to this illness. He recovered.

Remarks.

1. *Locality: (a) Physical features.*—Secondee, a large town on the sea coast.
- (b) *Occurrence of a series of cases in any one place.*—Three cases occurred during 1912—one in January, one in October, and one in December. Cases occurred in different parts of the town. He was in only temporary employment, so presume he lived in native portion of the town.
- (c) *Insect fauna.*—Mosquitoes—*stegomyia* and *anopheles*.
2. *Seasonal variation.*—These occurred during the dry season.
3. *Personal history: (a) Medical history.*—There is no record of his personal history beyond the fact that he was admitted to hospital as a pauper patient.
- (b) *Previous movements and personal conditions.*—Should say he had suffered from want before this illness.
- (c) *Microscopic examination of the blood.*—Not available.

E. W. GRAHAM,

Medical Officer.

CASE 40.

European official.

History of present illness.—He was admitted to hospital, Secondee, on December 2nd, 1912, suffering from fever. Two days previously he had come from Accra. He had been taken ill at Accra, and hoped that the sea trip to Secondee would put him all right. He developed hæmoglobinuria at 2.30 a.m. on December 3rd, 1912. From what I can gather, he has had five previous attacks of blackwater: two in

French territories, and three in Accra. This is subject to correction. The last attack appears to have been in Accra, five months ago. The treatment adopted during the first forty-eight hours was as follows:—

Saline injections every hour to hour and a half, ice *ad lib.*, to relieve thirst and check vomiting, bland fluids to drink *ad lib.*

Medicinally he was given *Mist. sodii bicarb.* and *Liq. hydrarg. perchlor.*, every two hours.

The urine at first was heavily charged with blood, but was passed in large quantities. There was at times a slight tendency to, but no vomiting. He had a very restless night, the first night, the temperature rose to 105°; as the result of wet packing the temperature came down to 98° next morning, December 4th.

On December 5th temperature rose again to 103·4°, was 100° at noon, and now continued between 100° and 101° for some time. The first urine passed this morning was clear for the first time, though still full of albumen. At 7 a.m. the pulse was 120, respirations 36, and he was inclined to be drowsy; at 8 a.m. a hypodermic injection of digitalis and strychnine for heart failure. The saline injections were continued, and every hour a few teaspoonfuls of milk with a little Brand's Essence were given by the mouth and retained. At 11.30 he was still very somnolent, but could be roused. Urine continued to be passed in fair quantity, was still clear and almost free from albumen. Pulse 120 and weaker. Respirations 48. The hypodermic injection of digitalis and strychnine was repeated and a little brandy and water was given by the mouth. At 4 p.m. he seemed a little better; he could move his arms and, though he could not talk, was quite conscious of what was said. At 6.30 there was again a falling off, very gradually progressing. Feeding by the mouth was stopped. The saline injections were continued, plus the addition of brandy and strychnine. A double hæmic murmur had now developed over the heart. The saline enemas were now intermitted with nutrient enemas. He continued to fail. In view of the large quantity of salines injected and retained in my opinion it was absolutely useless to try transfusion.

On December 6th at 3.30 p.m. temperature rose to 105·4°; wet packing was tried, but was of no avail and resisted by the patient as he feebly could. He was put in a cold bath for 10 minutes. The temperature rapidly came down to 103° and later to 99°. With a view of counteracting the poisoning by the products of decomposition, his rectum was douched out.

At 2.30 a.m. on December 7th the temperature again rose to 104°. At 4.30 a.m. with ice packing, temperature came down to 99°. Patient was now obviously dying. There was a further rise of temperature at 10 a.m., again subdued by ice packing. Just before death, at 4.30 p.m., there was a final rise of temperature to 106·4°.

Remarks.

1. *Locality*: (a) *Physical features*.—Seccondee, a large town on the sea coast.
(b) *Occurrence of a series of cases in any one place*.—Three cases occurred during 1912—one in January, one in October, and one in December. Cases occurred in different parts of the town. No previous case from his house. No swamp or bush adjacent to house.

(c) *Insect fauna*.—Mosquitoes variable, but generally scarce. The house itself is kept very clean.

2. *Seasonal variation*.—Case occurred during dry season.

3. *Personal history*.—Suffered a good deal from malaria fever, and succumbed to his fourth attack of blackwater. A very irregular quinine taker; owing to the nature of his work he was much exposed to the sun. Had blackwater in French Guinea in 1904.

(c) *Microscopic examination of the blood*.—Malarial parasites not demonstrated.

Polymorphonuclears	...	...	...	...	55·8
Lymphocytes	...	...	...	...	13·0
Mononuclears	...	...	...	...	20·0
Eosinophiles	...	...	...	...	2·8
Transitionals	...	...	...	...	7·6
Mast cells	...	...	...	...	0·8

A few fairly-pigmented large mononuclears.

E. W. GRAHAM, M.B., C.M.,
Senior Medical Officer,
Seccondee.

AXIM.
CASE 41.

European official.

History of present illness.—Patient, male, 29 years of age, was beginning his fourth tour of service in the Colony. He was tall, of slight build, and not very robust looking; a total abstainer, and a clean-living man.

Employed in the Public Works Department, he occupied a house on the outskirts of the town at an elevation of about four hundred feet above sea level, and usually went to and from his work in hammock. On a few occasions when he walked home in the evening he is known to have complained of the exertion of the long climb.

He arrived in the Colony about six weeks previous to his fatal illness, and apparently enjoyed good health. It appears that while he was on leave this last time he suffered from a severe rigor and vomiting, from which he made a speedy recovery. About eight and eleven days prior to the onset of blackwater fever he had two separate attacks of rigor accompanied by vomiting, the ill effects of which passed so quickly that he apparently did not consider it worth his while to mention the matter to the medical officer.

About a week after his last attack he got caught in a downpour of rain, and remained for a considerable time in his wet clothes before having a bath and a change into dry garments. On the following day, 29th October, he went about his work as usual, and retired to bed at about 9.30 p.m.

About midnight he was awakened by a rigor, and soon afterwards vomited; the stomach contents were slightly tinged with bile.

He then began to complain of severe abdominal pain and headache, and observed on passing water that it was darker than usual; the pain continuing, he sent for medical assistance, which arrived at 2.30 a.m.; this was on the 30th of October. The patient was found to be suffering considerable pain of a colicky nature and a tendency to vomit. He eventually ejected about a pint of highly bile-stained matter, and afterwards experienced some relief. Purgatives were administered, which acted some five times before 10 a.m. Hot cloths were applied to the abdomen. Temperature 101°, pulse 80; urine, port wine colour. He was seen again at 10 a.m. His rest had been disturbed by the action of the purgative, but otherwise he felt much better. The urine passed in the interval was darker in colour. The aspect of the patient was good, except for a mild degree of icterus, principally noticed in the conjunctivæ. He had had slight attacks of bilious vomiting. A pint and half of saline solution was given per rectum and repeated again at 10.15 a.m. and 1 p.m. He had instructions to drink plenty of water. He was admitted to hospital at 5 p.m. on October 30th. The journey tired him somewhat, but otherwise there were no prominent symptoms. Temperature 102.4°, pulse 100; blood films were taken at this stage of the case. No malaria parasites were found in the fresh specimens examined, but leucocytes containing malarial pigment were numerous.

October 31st.—Patient passed a good night. He had only one slight attack of vomiting. Bowels moved three times. He had numerous draughts of water, and three saline injections of a pint and a half each. The icterus was much more intense, and he complained of feeling weak. The urine at this stage was very little darker and was freely passed—seventy-two ounces being voided in the first twenty-four hours; when allowed to stand in a test tube the solids occupied about one-third of the volume. During the day the saline injections were continued; large quantities of fluid were taken by the mouth, and Brand's essence of chicken given, a few teaspoonfuls at a time at varying intervals. During the night the patient slept well, waking at intervals, in which saline injections were given, also drinks, and occasionally Brand's Essence.

November 1st.—His appearance was little altered beyond a further deepening of the icterus and somewhat anxious countenance. The urine became lighter in colour, and the amount of solids occupied about one-tenth of the volume; one hundred and eight ounces were passed in the twenty-four hours. During the morning, however, his mind began to wander, and he became restless. Saline solution was given under the skin. At mid-day his temperature reached 102.4°, pulse 128, thready. His general condition improved towards the evening, and he spoke quite rationally at 5 p.m. The urine, which had steadily been clearing all day, was now the colour of malt vinegar, and the amount of solids was reduced to a comparatively small quantity.

Between 5 and 7 p.m. he took five teaspoonfuls of Brand's Essence and seven ounces of saline solution was given. He was left in charge of the nurse, who made the following notes:—7 p.m.: passed urine, bowels moved once. 8 p.m.: saline injection, one pint; temperature $101\cdot4^{\circ}$. 9.28 p.m.: patient's condition became suddenly bad; strychnine hypodermic given; patient died 9.30 p.m., November 1st.

Post-mortem examination.—An autopsy was made twelve hours after death. The liver and spleen were enlarged, the latter to about twice its normal size, and was engorged with blood.

The kidneys, except for their pale colour, were normal in appearance; the heart was enlarged, and there was fatty degeneration of the muscle fibre.

Remarks.

1. *Locality: (a) Physical features.*—Axim is on a rocky sea coast, and the land rises immediately behind the town into hills with deep valleys between.

Forest and bush on the hills, and swampy, bushy land in the valleys.

(b) *Occurrence of a series of cases in any one place.*—As far as can be ascertained no other cases occurred in this locality, but in the town, one-quarter of a mile away, two cases occurred in 1911, one of which was fatal, and another fatal case in 1912.

(c) *Insect fauna.*—Anopheles, stegomyia, and *Glossina palpalis*.

2. *Seasonal variation.*—This case occurred at the beginning of the tornado season.

Axim is a very wet place, and rain falls every month. Heaviest in May and June.

3. *Personal history: (a) Medical history.*—Arrived in West Africa in 1908. Four distinct attacks of malaria are recorded against him, but, being a foreman of works, and often away from medical aid, he might have had others. The patient himself admitted having two sharp attacks during the six weeks previous to his fatal illness. He was very irregular in taking quinine.

(b) *Previous movements and personal conditions.*—Previous tour spent in Ashanti and Accra. Exposed to sun and weather.

(c) *Microscopic examination of the blood.*—Malaria parasites were not demonstrated, but his blood was in a malarious condition. Autopsy revealed a spleen double the normal size. Liver enlarged one-third, and fatty degeneration of the muscle fibre of the heart.

R. O. WHITE,
Medical Officer

CASE 42.

European—non-official.

History of present illness.—The patient, a male, aged about 45 years, had been associated with the West Coast of Africa for over 14 years as a contractor. He was in the habit of remaining in the country for periods varying between one and three years; a man of robust constitution, and used to "roughing it"; he was constantly exposed to malaria infection, and, as an old "coaster," looked upon fever with an indifference born of familiarity.

He had completed thirty months of unbroken residence in the Colony at the time of his last illness, and to my knowledge was suffering from malaria for a week prior to the onset of blackwater fever. During this period he was not under treatment, and went about his work as usual. On the evening preceding his illness he played two hard sets of tennis, and afterwards expressed himself as feeling "done up." He went home shortly afterwards, retired to bed at 11 p.m., and was awakened an hour later by the symptoms of a severe rigor. Between three and four hours later he passed a large quantity of urine, the colour of a very strong solution of permanganate of potash. This was found to contain hæmoglobin, albumen, and a small percentage of red blood corpuscles. Examination of his blood revealed malarial infection. During the first three days of his illness he had to be treated in his quarters as the hospital was full. His condition during this time calls for no special comment beyond the fact that the urine maintained its quantity, and that the colour lightened towards the end of the third day. The only unfavourable symptom was an irritable cough, which made the patient inclined to vomit and disturbed his rest.

The treatment during this period consisted of saline injections every three hours during the day; large quantities of water were taken by the mouth, chicken broth and barley water were given at frequent intervals. The coughing was controlled by a mustard leaf over the epigastrium, and the patient was given small pieces of ice to suck. On the evening of the third day the patient was removed to hospital. On the following day his urine was free from hæmoglobin, but contained a considerable amount of albumen; 68 ounces of urine were passed. The quantity of albumen decreased considerably on the 5th day, and was entirely absent on the 6th. The temperature during the first five days oscillated between 100° and 103° , rising on the morning of the 6th day to 105.2° . A hypodermic injection of strychnine and digitalin reduced the temperature in three hours to 100° . During the next two days it varied between 102° and 103° , only rising above this point on the 9th day to 106° , just before death. Throughout his illness the patient took and retained nourishment exceedingly well. He got an egg-flip, containing a teaspoonful of brandy, every three hours, and chicken broth about every half hour. During the six days he was in hospital he was more or less delirious all the time, with short intervals of rest. His condition was one of toxic anæmia, in which the destruction of the red corpuscles was so excessive that a sufficient number could not be restituted in time to maintain life.

Remarks.

1. *Locality*: (a) *Physical features*.—Axim, a town on the sea coast.
 (b) *Occurrence of a series of cases in any one place*.—One other case occurred during 1912. Owing to his work he was constantly working amongst natives.
 (c) *Insect fauna*.—Mosquitoes—*stegomyia*, *anopheles*, and *Glossina palpalis*.
2. *Seasonal variation*.—Dry season.
3. *Personal history*: (a) *Medical history*.—Patient had been coming to the Coast for 14 years, and had completed thirty months unbroken residence in the Colony at the time of his last illness; took quinine irregularly.
 (b) *Previous movements and personal conditions*.—Had been thirty months in Axim.
 (c) *Microscopic examination of the blood*.—None.

R. O. WHITE,
Medical Officer.

ADDAH (QUITTAH).

CASE 43.

Government official.

History of present illness.—Onset mid-day, Wednesday, November 6th. He passed a small quantity of very dark-coloured urine; feeling of general malaise, burning in legs and hips, and heaviness in loins. Bowels were opened and urine clear two hours later. Went to bed during the afternoon; but left for Cape St. Paul on bicycle about 4.30 p.m. Felt very tired; took some soup and quinine, grs. 10, on arrival, and then went to bed. Woke up in night with a rigor; took some brandy. A little later vomited (watery), and passed very dark-coloured urine (port wine colour). Vomited three or four times during night, and felt very ill. During day, November 7th, did not vomit, but urine continued port wine colour. Left Cape St. Paul 4.30 p.m. in hammock; vomited on arriving at Quittah. Was put to bed by the District Commissioner and fainted twice; vomited during night; temperature was 101.6° .

On November 8th vomited whenever anything tried to be taken; urine still port wine coloured.

On November 9th I saw the patient. He was very thin and "drawn" in the face; skin and scleræ a deep yellow tint. Mouth very sore from septic teeth; had vomited just before my arrival.

Temperature 99° , pulse 100, respiration 14. Urine port wine colour, acid, sp. gr. 1018, and, on standing, separated into two well-marked layers. Albumen present. Hæmoglobin present (by spectroscope). The urine was passed without difficulty. On examining the blood no malaria parasites were found. Calomel grs. 5 given alternate days, and frequent drinks of soda water. Mouth wash given. He had no more vomiting. Bowels were kept open, and on November 11th urine was much clearer. Temperature remained normal and patient felt easier, but very weak; was put on to light diet, which he retained. Went on improving during next two weeks, when he was convalescent and invalided to England.

Remarks.

1. *Locality*: (a) *Physical features*.—Quittah is situated on a narrow strip of sandy beach, varying from a quarter to half a mile wide, with a large freshwater lagoon on the land side. Bush and swamp.

(b) *Occurrence of a series of cases in any one place*.—No record.

(c) *Insect fauna*.—Anophelines and *Stegomyia fasciata* plentiful.

2. *Seasonal variation*.—Dry season.

3. *Personal history*: (a) *Medical history*.—Good health record Had malaria at Axim in 1911. Irregular quinine taker.

(b) *Previous movements and personal conditions*.—Had been stationed in the Colony most of his service; lived in the native town at Quittah in poor quarters.

(c) *Microscopic examination of the blood*.—No malaria parasites.

R. MUGLISTON,
Medical Officer.

DUNKWA.

CASE 44.

European (non-official)—Mines.

Previous history.—This patient, aged 53 years, had hæmoglobinuric fever twice before, and although not in the habit of taking quinine, had very few attacks of malaria.

History of present illness.—I saw him on the 18th December last with temperature of 102° F.; tenderness over the lumbar region with some vomiting; tongue moist and furred; urine claret-coloured and scanty. A good dose of *hydrarg. subchlor.* given opened the bowels, and then he was placed on *liq. hydrarg. perchlor.* m. 15 c. *sodii bicarb.*, grs. 5, every few hours. Under this treatment the urine somewhat cleared up, but it became very dark coloured and inky again the following afternoon. The urine, on examination, was found to contain much albumen and a few casts with large quantity of hæmoglobin. No parasites were found in his blood, but a great number of leucocytes were pigmented. For five days his temperature kept up from 100° F. to 102° F. in the afternoon, the urine passed becoming very dark in the afternoons. His bowels were kept free all the time, and he was placed on liquid diet, and salicylates were also given internally. His temperature came down by lysis, and he was convalescent on the 10th day, the attack having been of a mild nature.

This is the only case that came under my notice, native or otherwise, during the year 1912.

Remarks.

1. *Locality*: (a) *Physical features*.—Dunkwa, an important station in the Secondee-Coomassie Railway. The town is situated in forest country.

(b) *Occurrence of a series of cases in any one place*.—No other cases.

(c) *Insect fauna*.—Mosquitoes—*stegomyia* and *anopheles*; numerous in wet season. *Tabanus*. No fleas, lice, or bugs.

2. *Seasonal variation*.—Dry season when case occurred.

3. *Personal history*: (a) *Medical history*.—No history obtainable except that he had two previous attacks of blackwater, but little malaria. Did not make a practice of taking quinine.

(b) *Previous movements and personal conditions*.—Did most of his work in the bush.

(c) *Microscopic examination of the blood*.—No parasites, albuminuria, casts nor pigmented leucocytes.

P. M. TOBIT,
Medical Officer, Dunkwa.

WA.

CASE 45.

On the 18th August, 1912, at Wa, Northern Territories, I passed through a typical attack of ague, commencing at noon and characterised by intense headache

and vomiting. I had been only three weeks in the station on returning from leave home. (On the road up from Coomassie I had two similar attacks, commencing and lasting the same identical time, but which never prevented me from continuing my journey next morning.)

On the morning of the 19th August, 1912, feeling all right, I attended hospital as usual and walked round the native town, returning at noon, when I again went down. This time the symptoms never abated, afterwards the vomiting becoming incessant, and at 12 o'clock midnight I passed urine of a very dark colour. I had no sleep during the night, and on passing urine next morning at 6 a.m. found it of a jet-black colour. I asked the Provincial Commissioner, Major B. Moutray Read, to come and see me, and he immediately sent for Drs. Storey and Thompson, stationed at Lorha and Bole. The symptoms increased, the vomiting being very distressing, never ceasing during the day or night.

On the morning of the 21st August, 1912, I was in a very weak condition; the muscles of my vocal cords becoming paralysed, I could not speak. The symptoms continued in severity. I was absolutely unable to retain any nourishment taken by the mouth. The only sleep I got, I believe, was through the aid of sulphonal, every other drug I tried having no effect.

On the 22nd August, at 4 p.m., thinking everything was finished, as I was passing only a very small quantity of urine, and that of the consistency of thick jelly, I pointed out my quinine bottle and took 15 grs. I had one hour's interval before I vomited again. At 12 p.m. I passed quite a large quantity of thin black urine. I took another 15 grs. of quinine, and at 6 a.m. my urine was just of the ordinary high colour you would expect with any fever. I continued 20 grs. of quinine a day for a week afterwards, then 15 grs. for a week, then 10, and finally 5 grs., which I have kept up ever since. I don't think I would risk the same treatment with quinine to anybody else. I never took my own temperature, as I never could; knowing I had fever I did not want to know the degree. The Provincial Commissioner took my temperature all through, and also notes on my case, which he handed over to Dr. Thompson.

Drs. Storey and Thompson examined my blood, but could find no parasites present; also my urine, with a like negative result.

I would like to inform you that after my first tour, towards the end of 1910, when I was taking out the course at the Liverpool Tropical School, one day I was not feeling very well, and had my blood examined, with the result that every man in the class, together with the teachers, found it teeming with "crescents."

Remarks.

1. *Locality: (a) Physical features.*—Open orchard, flat, ironstone country; no swamp within two miles of station.

(b) *Occurrence of a series of cases in any one place.*—I know of no other case of blackwater in the district.

(c) *Insect fauna.*—*Stegomyia*, *Culex pipiens*, anopheles, sand-flies.

2. *Seasonal variation.*—No unusual climatic conditions. No rains whatever during my three weeks in station.

3. *Personal history: (a) Medical history.*—During my first tour, 1909-10, had two attacks of sub-tertian malaria. Had another attack during my leave home towards the end of 1910.

During my second tour, 1911-12, beyond feeling slightly indisposed on a couple of occasions, no trouble whatever. On returning from home, and proceeding from Coomassie to Wa, Northern Territories, had two attacks on the road, of apparently sub-tertian. Three weeks after reaching my station, Wa, had another which ended up with blackwater. Been very regular in taking quinine, but neglected doing so somewhat during my journey home, and also on the trek from Coomassie to Wa.

(b) *Previous movements and personal conditions of patient.*—Just returned from leave home, and three weeks arrival in station after about a three weeks' trek from Coomassie. My third tour in the Colony.

(c) *Microscopic examination of the blood.*—No Medical Officer in attendance; on the point of convalescence when two Medical Officers arrived after forced marches night and day; nothing abnormal could be found in my blood after repeated examinations, except loss of hæmoglobin.

E. BRABAZON,
Medical Officer.

SOUTHERN NIGERIA.

During the year 1912 twenty-three cases of blackwater fever were reported to have occurred in Southern Nigeria, a number considerably below the average for the last five years, which was, in round figures, thirty-five. Of these cases, twenty-one were in Europeans, and two in West Indians. With the exception of one European missionary all the patients were males. Five cases terminated fatally.

Age.—The ages of the patients ranged between twenty-two and forty-seven. The majority occurred in persons between thirty and forty years. The average age of the European residents, amongst whom most of the cases occurred, should, however, be borne in mind in considering the possible significance of this fact.

Age.					Cases.	Deaths.
Under 30 years	...	...	...	...	5	2
30 to 40 years	...	...	...	...	13	3
Over 40 years	...	...	...	...	5	0
Totals					23	5

Occupation.—Of the twenty-one Europeans who suffered from the disease, five were Government officials (including the West African Frontier Force and the Nigerian Railways), two were missionaries, and the remaining fourteen were merchants, miners, &c.

Occupation.					Cases.	Census of 1911.	Per cent.
Government Officials	...	...	...	...	5	630	0·79
Merchants, &c.	...	...	...	...	14	798	1·75
Missionaries	...	...	...	...	2	191	1·04

According to the census of 1911 there were in Southern Nigeria 630 Government officials, 798 merchants, &c., and 191 missionaries. Assuming that the relative proportions remained approximately the same in 1912, it will be seen that the percentage of merchants suffering from blackwater fever was considerably higher than that of officials, and higher, but to a lesser degree, than that of missionaries. This fact must, no doubt, be correlated with the better conditions and shorter tour of service enjoyed by officials.

Locality.

Station.—Ten of the twenty-three cases occurred in the Central Province, seven in the Western Province, and six in the Eastern Province. One of the cases in the Eastern Province (Case 20), and one in the Central Province (Case 55), commenced on board ship, and cannot with justice be referred to any particular locality.

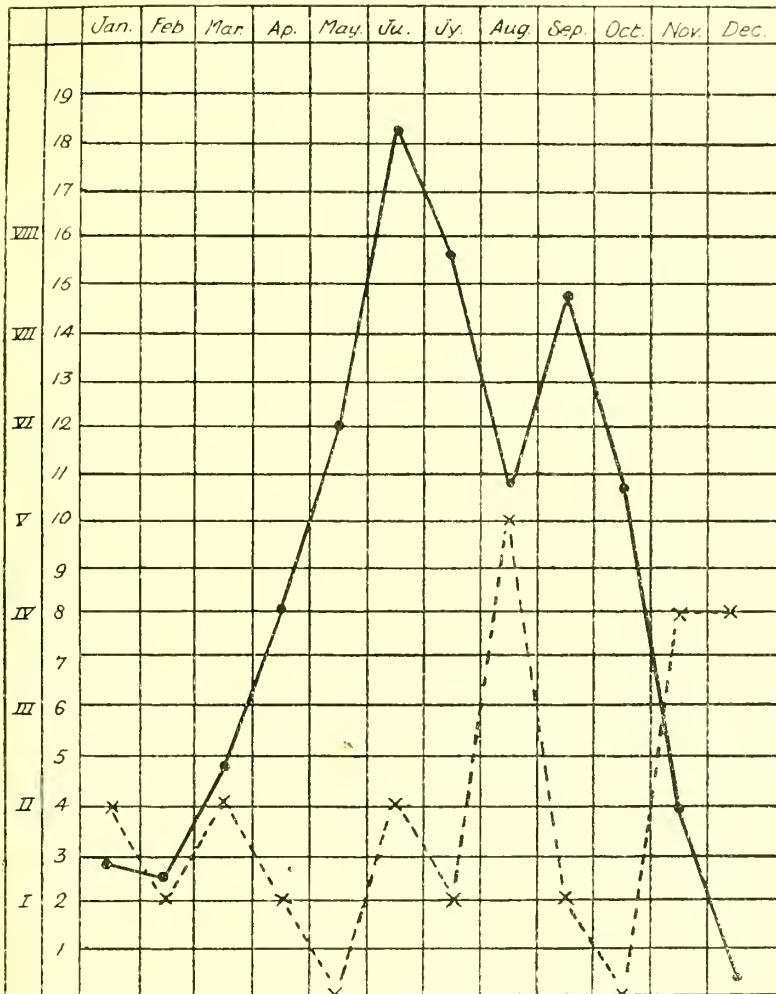
In the synopsis of cases appended to this report, a description of the physical features of each locality will be found, together with a note on the insect fauna so far as it is at present known, and any significant facts relating to the previous movements and personal conditions of the patients, and the nature of the quarters occupied by them.

Season.—The climate of Southern Nigeria is of the equatorial type. The dry season lasts from the end of October to the beginning of March, and the rainy season occupies the remaining eight months. The heavy rains fall during the months of April, May, June, and July, and the light rains during August, September, and October.

The year 1912 was, however, an exceptional one, inasmuch as the rainfall was unusually small. At Lagos, for instance, the rainfall in March was only 0·20 inch, whereas the average amount for this month during the last five years was 4·84 inches.

The chart given below shows graphically the distribution over the months of the year of the cases of blackwater fever in 1912, and the combined average rainfall for the last five years at the three headquarter stations, Lagos, Warri, and Calabar. The majority of the cases occurred during the dry season, and the highest number was in August, a month which covers the period of lull in the middle of the wet season, when but little rain falls.

BLACKWATER FEVER AND THE RAINFALL.



Continuous line and arabic figures indicate combined average rainfall for the three headquarter stations, Lagos, Warri, and Calabar, in inches.

Dotted line and roman figures indicate blackwater fever cases.

Occurrence of a series of cases in any one place.—Five cases of blackwater fever occurred at Lagos in 1912, four at Warri, and three at Sapele. All these three places may be described as low-lying and swampy, and although but little is known definitely about the entomology of Warri and Sapele, there can be little doubt that all three towns are the haunt of innumerable biting insects. The two cases recorded from Eket are noteworthy, as both patients were members of the Qua Ibo Mission. The first case occurred on August 20th, the second on November 22nd. A third case has recently been reported from the same mission station, on April 4th, 1913. Case 53, which occurred at Calabar on June 22nd, was that of a medical officer who had recently been stationed at Eket. He had been living in a bush hut, and in the course of his work had undertaken a large amount of travelling. Although this series of cases is too scattered in time to suggest an epidemic of blackwater fever, it does lend support to the view that there exists at Eket some particular character that predisposes to the disease. Primitive quarters and extensive travelling may have been contributory or predisposing causes.

Personal History.

Medical history of the patient.—In every case, except Cases 46 and 55, of which the histories are unavoidably incomplete, the patient had suffered from malarial fever before the attack of blackwater fever. As a rule the history was to the effect that the patient had had repeated attacks of "fever," and that for some weeks before the onset of the hæmoglobinuric attack he had been feeling slightly unwell.

In only one case (Case 58) was there a definite history of a previous attack of blackwater fever, and this had occurred twelve years earlier.

Quinine prophylaxis.—Quinine was not taken at all as a prophylactic, or was taken irregularly, in over half the cases. Euquinine had been taken regularly in

one case, and in two others the prophylactic doses of quinine had been 10 grs. a week, and 5 grs. every other day, respectively.

General habits.—In one case the patient was returned as intemperate. Three were total abstainers. Two patients had been careless in the use of their mosquito-curtains, and one was rash in exposing himself unduly to the rays of the sun.

West African service.—The length of service on the West Coast of Africa was recorded in seventeen cases. Eight of the cases (with one death) occurred in persons who had been serving in West Africa for less than five years, and nine (with two deaths) in those who had completed a longer period. The length of service ranged from four months to twenty-four years.

Length of the preceding tour of service.—Five cases occurred in persons who had been in West Africa for less than six months before the attack, seven in those who had been out over six months but less than a year, and seven in those who had completed a residence of a year or longer.

Length of Tour.					Cases.	Deaths.
Under 6 months...	...	...	...	...	5	1
Between 6 and 12 months	...	...	...	...	7	1
Over a year	...	...	...	...	7	2
Totals					19	4

In this table only Europeans are included, and one case, the master of an ocean-going steamer, is excluded. In another case the length of tour was not stated.

Blood examination.—In all the cases, with the exception of three, the blood was examined at some stage of the disease. In fifteen cases no malaria parasites were found. In two cases small ring-like sub-tertian parasites were found in the blood taken just after the onset of the attack; in one case they were found just before the onset of hæmoglobinuria, and in two cases they were detected on the day after the attack began.

The Blackwater Fever attack.

The dose of quinine immediately preceding the attack.—The dose of quinine immediately preceding the attack of blackwater fever was seldom a large one, generally 5 or 10 grs. only. In one case (Case 58) no quinine at all had been taken as the patient was unable to tolerate the drug.

In those cases in which the onset of hæmoglobinuria appeared to be precipitated by an unaccustomed or unusually large dose of quinine (Cases 49, 52, &c.), the interval elapsing between the dose and the subsequent blackwater was usually about five hours.

Hour of onset.—The onset occurred at any time from early morning to late at night in the twenty-two cases in which the hour was noted. There was, however, a decided majority of cases commencing in the afternoon and evening. In eight cases the hour of onset lay between 1 a.m. and 12 noon, and in fourteen between 1 p.m. and 12 midnight. In this respect the cases of blackwater fever differed from attacks of malarial fever, two-thirds of which, according to Sir Patrick Manson, "come off between midnight and midday."

Jaundice.—In almost every case in which the symptom was recorded, jaundice was noted to have been present on the second day. In one case it was observed fifteen hours after the onset, and in five cases it appeared at the same time as, or immediately after the hæmoglobinuria. In only three cases was jaundice noted as absent, and in one of these the patient's skin "acquired a peculiar lemon tinge." The jaundice, therefore, appeared early, unlike the icterus of yellow fever, which is a comparatively late manifestation.

General symptoms.—The general symptoms, in the order of their frequency, were rigor, vomiting, severe pains in the abdomen and back, headache, and restlessness. In some cases diarrhœa was a feature, in others constipation. The spleen was slightly enlarged in a few, and intense thirst, tracheitis, and cardiac bruits were also observed. Diminution of the amount of urine excreted was always a grave symptom. Anæmia and debility marked those severe cases that recovered. Details of each case will be found in the synopsis.

The duration of the hæmoglobinuria varied from a few hours in some cases to five days in others. The urine generally continued to contain albumen for a day or

so after the blackwater had cleared. In three cases (Cases 48, 50, and 56) there were two or three distinct periods of hæmoglobinuria in the course of the attack.

The cases fall naturally into two main groups. In those belonging to the first group the hæmoglobinuria was transitory, was accompanied by relatively mild symptoms, and appeared as a grave phenomenon supplanted on a typical malarial attack. No case of this type was fatal. Case 53 may be considered as typical of this group. The patient was admitted to hospital with what appears to have been a typical malarial attack. His urine was quite clear, acid, free from albumen, and with a specific gravity of 1020. He passed a good night, and next morning was better. In the afternoon, however, the fever returned, with vomiting and hæmoglobinuria. The temperature did not remain high, but fell rapidly, and within twelve hours the urine was once more quite clear, and contained only a trace of albumen. The further progress of the case was uneventful. Cases 47, 51, 58, 59, and 64 also would appear to belong to this group.

In the cases belonging to the second group the hæmoglobinuria was of longer duration, and was a marked feature of the disease. The accompanying symptoms were correspondingly severe, and there was a tendency to develop suppression of urine. In three cases the disease ended fatally. The less severe cases of this type were characterised by an irregularly maintained fever, hæmoglobinuria persisting for several days, and an abundant excretion of urine. After a somewhat prolonged convalescence the patients made satisfactory recoveries. Case 67 was of this type. The hæmoglobinuria persisted for four days, and was accompanied by an irregular temperature, which did not come down to normal until the urine had cleared. Abundant urine was passed throughout the attack, and when once the hæmoglobinuria had cleared up the patient pursued an uninterrupted course to convalescence. Cases 46, 52, 60, 63, and 66 were of this type. Case 68 is an example of the more severe form of the disease, in which suppression of urine intervened and a fatal termination resulted.

The onset of the attack was, in this case, very sudden, and was ushered in by a severe rigor, vomiting, and pains in the chest. The urine was quite black, and went nearly solid on boiling. The hæmoglobinuria and the fever persisted for four days, during which urine was passed freely; but on the fifth day suppression of urine set in, and the patient collapsed and died. In some cases the tendency to suppression was exhibited from the beginning of the attack.

Two cases (Cases 57 and 62) offer an interesting comparison. Both were severe cases, with high fever and well-marked hæmoglobinuria, and both were complicated by dysenteric diarrhoea. In the former case suppression of urine was a conspicuous feature from the beginning, and, although the last few drachms of urine excreted were free from hæmoglobin, the patient died. In the latter case urine was passed freely, and the hæmoglobinuria cleared up soon after the temperature began to fall, and the patient made a satisfactory recovery.

Without entering on the vexed question of the cause of the disease, and limiting oneself strictly to the consideration of the twenty-three cases which occurred in Southern Nigeria in 1912, there can be no doubt that blackwater fever may appear with an acute malarial paroxysm. The mild cases already referred to which were characterised by transient hæmoglobinuria were apparently of this nature. In several cases ill-health was a predisposing cause. For example, Case 48 was complicated by cardiac disease, Case 57 by dysenteric diarrhoea, Case 62 had just recovered from a severe attack of dysentery, and Case 66 had a chronic colitis. The majority of the cases had a history of ill-health extending over the last few weeks, and not a few had suffered recently from repeated slight attacks of "fever." In practically every case there was evidence of repeated malarial infections.

An attempt to correlate the cases with the prevalence of malaria in the various localities was inconclusive. It was found impossible to trace any connection between the occurrence of blackwater fever and the percentage of the cases treated at the various stations that had been returned as malarial. The number of cases dealt with was probably insufficient, and, in any case, there is no question but that malaria is very prevalent all over Southern Nigeria.

Considering the very definite histories attached to such cases as Cases 49, 52, 54, and 56, there can be little doubt that an attack of blackwater fever may be precipitated by a dose of quinine. Muscular effort, as in Case 68, may also bring on the attack.

The marked distinction, referred to above, between the cases in which hæmoglobinuria was transitory and those in which it was more persistent, suggests the possibility that the factor which determines the hæmolysis may sometimes remain

in the blood after the case has come under treatment. Such as it is, the evidence in this report is in support of the view that blackwater fever is a manifestation of malarial toxicity. The customary treatment of blackwater fever in Southern Nigeria does not include the administration of any quinine, and in fact this drug was given during the hæmoglobinuric attack in only one case (Case 63) of this series. Malaria parasites which had played a part in the production of the disease might therefore remain in the blood, and continue to excite hæmolysis. It is worthy of note, in this connection, that all the four cases in the series in which the blood was found to contain malaria parasites *after* the onset of the attack were of the severer type. The persistence of the fever and hæmoglobinuria in them may have been due to the presence of these parasites. The fact that they were not found in every case of this type does not necessarily discredit this suggestion, as the detection of malaria parasites is often a tedious and difficult business under the most favourable conditions, and the busy life and primitive appliances of an out-station seldom permit of such accurate investigations. The few cases, such as Cases 47, 53, and 59, which developed blackwater fever in hospital whilst undergoing treatment which included the administration of quinine, were, moreover, of the mild type. It would, perhaps, be good practice, under these circumstances, to administer quinine with caution in those cases in which the fever and hæmoglobinuria persist.

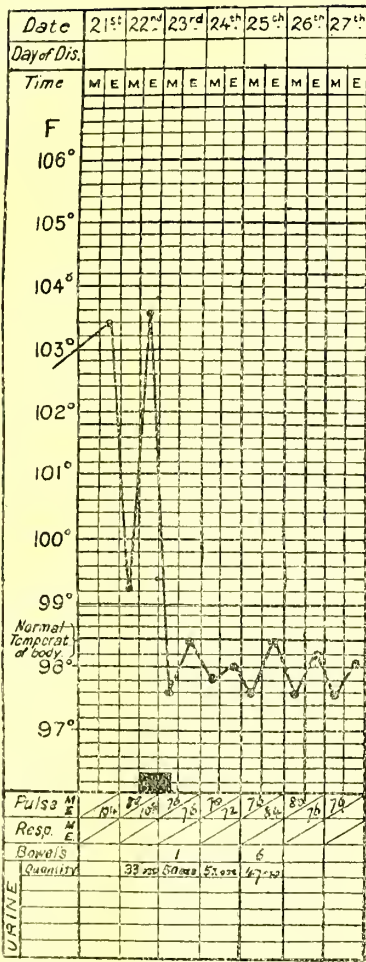
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Medical Research Institute, Yaba.

SYNOPSIS OF CASES OF BLACKWATER FEVER, SOUTHERN NIGERIA, 1912.

						<i>Cases.</i>
Western	Province :—					
	Ibadan	..	...	...	...	1
	Lagos	...	...	...	...	5
	Oshogbo	...	...	...	...	1
Central	Province :—					
	Benin City	...	...	...	...	1
	Onitsha	...	...	...	...	2
	Sapele	...	...	...	...	3
	Warri	...	...	..	...	4
Eastern	Province :—					
	Calabar	...	...	..	...	2
	Eket	...	...	...	...	2
	Ikom	...	...	...	...	1
	Ogoja	...	...	...	...	1
			Total	...	...	<hr/>23

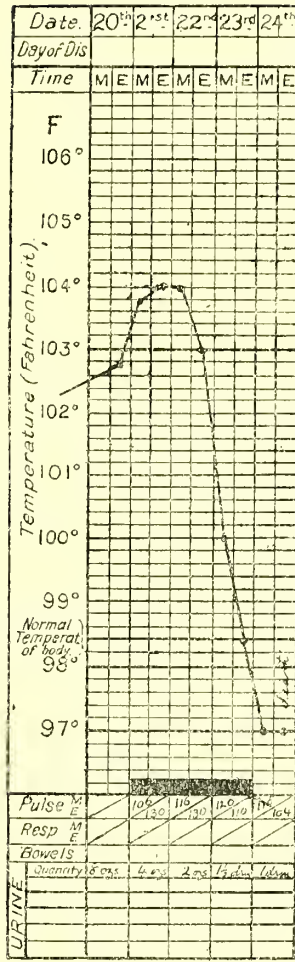
CASE 53.

June



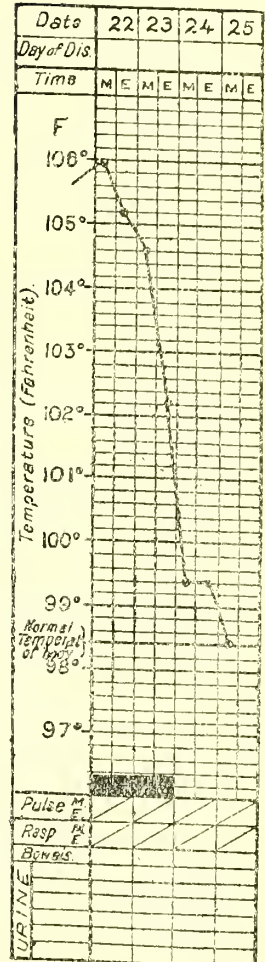
CASE 57.

August



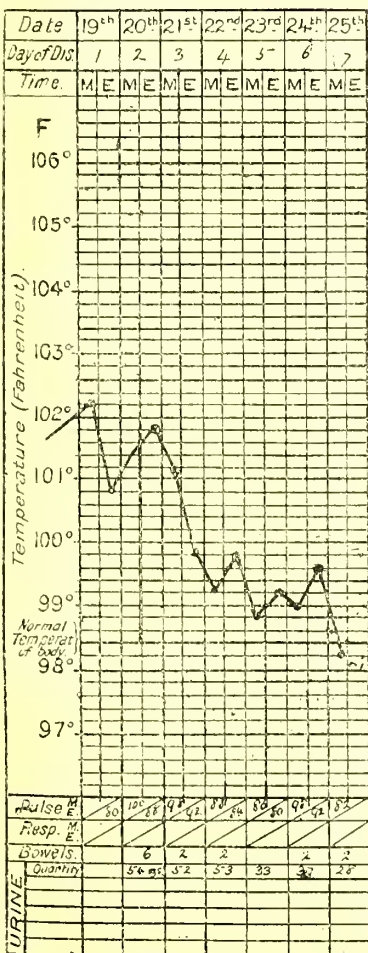
CASE 62.

November



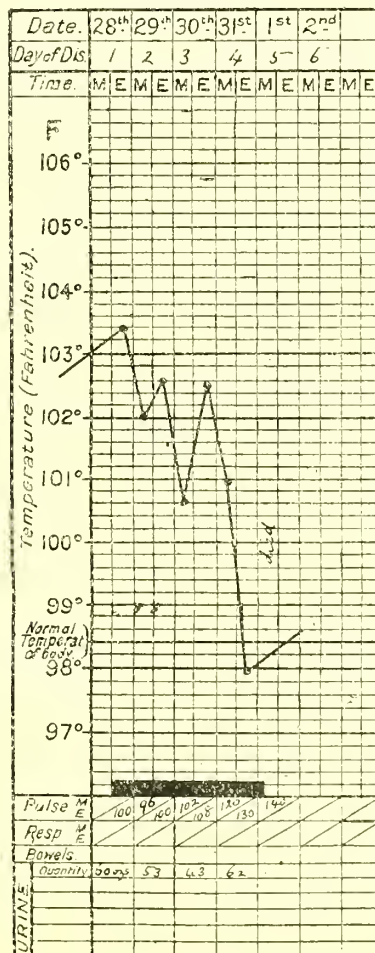
CASE 67.

December



CASE 68.

December



Case No.	Name, Description and Date.	Locality.			Seasonal variation and Climatic Conditions.	Per Service and General Habits.
		Station, Quarters and Physical Features.	Multiplicity of cases in the same place.	Insect Fauna.		
46	S., male, age 36, German, merchant. Jan. 20.	Oshogbo, a mud house with a pan roof, thick bush and oil-palm trees, well watered undulating country; no swamps.	One case in 1909, one in 1910, two in 1911, and one in 1912.	Glossina, Stomoxys, Tabanus, Chrysops, Hippocentrum, Haematopota; Culex, Myzorrhynchus, Myzomyia Mansonoides, Culicomyia, Stegomyia, &c. Ctenocephalus, Boophilus, Rhipicephalus, &c.	Dry season; month of lowest rainfall; rainfall 0.25 in. (average 0.18 in.), temperature: mean max. 91°6 F., mean min. 67°8 F.	No other tropical service; temperate habits.
47	M., male, age 35, British, fair, medical officer. Jan. 21.	Benin City, but previously at Sapele, undulating country, with a gradual slope to the sea. Where not cultivated covered by a dense evergreen forest.	No other case at Benin City since 1908, but see case No. 51 in regard to Sapele.	Glossina, Stomoxys, Tabanus, Chrysops; Rhipicephalus.	Dry season; rainfall nil (average 1.97 in.), temperature: mean max. 84°5 F., mean min. 62°8 F.	West Africa 8 years; in India 1 year; present tour 1 month.
48	J. W. C., male, age 34, European, fair, saw-miller. Feb. 1.	Lagos, on a low-lying island in a lagoon, mangrove swamps to the west. To the north the land rises slightly and is covered with bush where it is not cultivated.	Several cases (6 to 11) each year since 1905, 5 cases with 2 deaths in 1912 (not shown on map).	Glossina, Tabanus, Stomoxys, Stegomyia, Culicomyia, Culex, Myzorrhynchus, Myzomyia, Xenopsylla, &c.	Dry season; rainfall 1.87 in. (average 1.19 in.), temperature: mean max. 88°8 F., mean min. 76°6 F.	West Africa 1 year and 11 months; present tour 11 months.
49	E. J., male, age 30, negro, a native of Antigua, train guard. Mar. 14.	Lagos. Lived at Ebute-Metta. See No. 48.	See No. 48	See No. 48	End of dry season; rainfall 0.20 in. (average 4.84 in.), temperature: mean max. 90°9 F., mean min. 77°8 F.; rainfall at Ebute-Metta 0.05 in.	Twelve years in Cape Colony; present tour 2 years.
50	?, male, age 26, German, merchant. Mar. 30.	Warri. Good quarters. Low-lying and exceedingly swampy. Intersected by a network of rivers and creeks.	One case in 1906, one in 1909, and one in 1910. In 1912 there were four cases with two deaths.	Glossina, Tabanus	End of dry season; rainfall 4.17 in. (average 5.10 in.), temperature: mean max. 94°6 F., mean min. 73°0 F.	West Africa 3 years; present tour 18 months.
51	C. S., male, age 22, German, fair, merchant. April 26.	Sapele. Low-lying and swampy. Intersected by innumerable creeks. Forest much thinned by cultivation.	Two cases in 1907, two in 1909, four in 1910, and four in 1911. In 1912 three cases.	Glossina, Chrysops	Beginning of the rainy season; rainfall 13.58 in. (average 10.76 in.), temperature: mean max. 82°6 F., mean min. 72°3 F.	West Africa 11 months; present tour 11 months; temperate.
52	A. G., male, age 35, British, fair, colour-sergeant. June 2.	Ogoja, bush hut. On the left bank of the River Aiya, broken and hilly, with patches of thick bush; on the right bank open level grass country, well watered.	One previous case, in 1911.	Glossina ...	Rainy season; no records available.	Four tours of one year each in West Africa; served in South Africa; present tour 5 months.
53	R. W. G., male, age 47, British, eyes grey, hair dark, Medical Officer. June 22.	Calabar, also Benin City, Opobo and Eket. At Eket lived in a bush hut and was constantly travelling. Hilly country densely covered with forest much intersected with creeks.	Two cases in 1905, eight in 1906, five in 1907, and three in 1908. In 1912 two cases.	Glossina, Tabanus, Chrysops; Myzomyia, Culex, Culicomyia, Ochlerostatus, Hodgesia.	Rainy season; rainfall 15.90 inches (average 16.37 ins.), temperature: mean max. 94°1 F., mean min. 71°9 F.	West Africa 9 years; in India 8 years; present tour 9 months. Teetotaler and non-smoker.

Past History.			Blackwater Fever.					
Previous illnesses, malaria, &c.	Previous attacks of Blackwater Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of Onset and Onset of Jaundice.	General Symptoms.	Duration of Hæmoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and result.
—	None ...	5 grains daily. 5 grains ...	6 p.m. ... Second day of illness.	Onset with severe headache, hot dry skin, pulse 90, temperature 101°F, urine scanty. Next day only 3 ozs. of urine passed, hæmoglobinuria, slight icterus, no vomiting.	5 days	5 days	—	7 days ; recovery
Three or four short attacks of malarial fever each tour.	None ...	Irregular or not at all ; 10 grains and 30 grains on each of the two preceding days.	11 a.m. ... Second day of illness.	On January 19th there was a simple attack of fever. No fever on January 20th. Return of fever on January 21st at 11 a.m. with hæmoglobinuria. The urine cleared during the next 24 hours, and the temperature fell rapidly. Spleen slightly enlarged on January 22nd, and cardiac asthenia noted on the following day and until January 29th. No vomiting.	12 hours	4 days	Negative at the height of the attack.	15 days ; recovery ; invalided.
Several slight attacks of malarial fever.	None ...	Regular ...	7 p.m. ... Second day of illness.	Fever, vomiting, "porter-like" urine, rapid feeble pulse. Complicated by myocardiac debility.	Three separate attacks covering 16 days, namely, on the 1st, 2nd, 7th, 8th, 9th and 16th day of the illness.	21 days	Negative.	21 days ; recovery ; invalided.
Suffered much from fever.	None ...	Quinine taken only when feverish ; 5 grains.	11 a.m. ...	Onset at 5 a.m. on March 14th, feverish, vomiting. Took 5 grains of quinine. At 11 a.m. passed dark-coloured urine. Thereupon took 20 grains more quinine. Admitted to hospital next day. Temperature 99.6°F.; pulse 68, strong, regular. Spleen not palpable. No improvement on 16th. On 17th urine clear, but very scanty. Died from heart failure on 18th.	4 days	5 days	Negative on second day.	5 days. Death.
Several short attacks of malarial fever.	Uncertain; possibly two previous attacks.	None. Also the use of a mosquito curtain neglected. Probably 20 grains.	11.30 a.m.... Never jaundiced, but the patient's skin acquired a peculiar lemon tinge.	Initial fever on March 30th, 103.8°F., with copious dark-coloured urine. Later on same day clear urine passed, and temperature fell rapidly to below normal. Return of fever on the afternoon of March 31st, rose to 103°F., but fell rapidly to nearly normal. No hæmoglobinuria. Return of fever with rigor and blackwater on April 2nd. From this date partial suppression of urine. On April 8th tracheitis developed and the patient's condition became worse. Died April 10th.	First attack, 4 hours; second attack, 3½ days.	First attack, 18 hours; second attack, 9 days.	Negative on first day.	12 days. Death.
Three attacks of malarial fever.	None ...	9 grains just before attack.	Probably about 12 p.m. Present on second day of illness.	Pains in the head and back, constipation, urine dark but passed in fair quantities. Fever fell rapidly and was nearly normal on the third day of illness.	—	8 days	Negative.	10 days. Recovery.
Slight attack of remittent fever in February.	None ...	Euquinine taken regularly. 15 grains euquinine; 10 grains of same drug had been taken earlier in the same day.	10 p.m. ... Immediate.	Slight malaise previous to the onset. Onset very sudden. At 7 p.m. seemed well, but feeling feverish took 15 grains euquinine. At 10 p.m. delirious, vomiting incessantly, intense thirst, agonising pains in loins, epigastrium, and legs. Temperature 104°F., pulse 100. At midnight passed dark urine. The fever fell rapidly and reached 99°F. next day; urine passed freely, but dark coloured until the fourth day, when, but for his weakness, the patient seemed well.	3 days	3 days	Films taken soon after the onset showed subtertian rings.	3 days ; recovery ; invalided.
Four attacks of malarial fever during present tour of service.	None ...	Irregular... 5 grains ...	5 p.m. ... No jaundice	Admitted on 21st June with malarial fever. headache, T. 103.2°F., urine clear and free from albumen, crescents and ring parasites in blood. Temperature fell rapidly and next morning was 99.6°F., but at 5 p.m. the fever returned, the patient vomited once, and a few minutes later passed 10 ozs. hæmoglobinuric urine. No tendency to suppression and urine quite clear, and with only a trace of albumin by 4.15 a.m., June 23rd.	A few hours only.	18 hours	Both crescents and young rings in blood just before the onset of hæmoglobinuria.	18 hours ; recovery ; invalided.

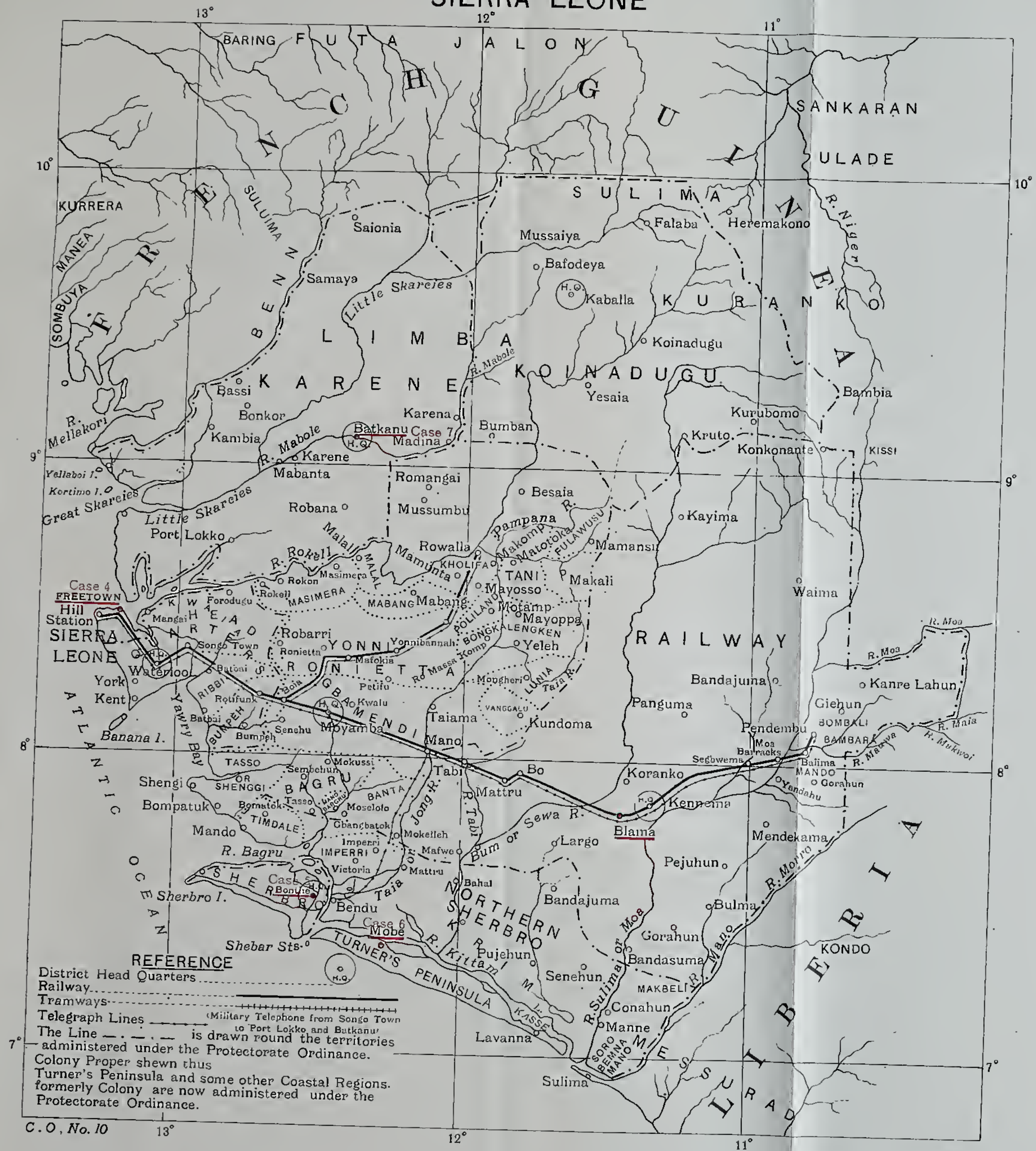
Case No.	Name, Description and Date.	Locality.			Seasonal variation and Climatic Conditions.	Per Service and General Habits.
		Station, Quarters and Physical Features.	Multiplicity of cases in the same place.	Insect Fauna.		
54	J. E. T., male, age 42, West Indian (Jamaica), black hair, yellow complexion, clerk. July 29.	Warri. See No. 50	See No. 50 ...	See No. 50 ...	Rainy season; average rainfall 14.56 in.	West Africa 17 years, of which 6 months spent at Warri, and the rest at Sierra Leone. One year in British Honduras and three months at St. Helena. Present tour 14 years.
55	J. B., male, age 33, European, hair dark, complexion ruddy, miner. Aug. 2.	Onitsha, but had just arrived from the Gold Coast.	As this patient had not resided at Onitsha observations under these heads are not relevant.			Over three years on the Gold Coast; present tour 5 months. Intemperate.
56	J. C., male, age 33, European, grey eyes, light hair, merchant. Aug. 11.	Lagos. See No. 48...	See No. 48 ...	See No. 48 ...	Rainy season; period of diminished rainfall in the middle of the wet season; rainfall 0.23 in. (average 1.68 in.), temperature: mean max. 83°6 F., mean min. 73°4 F.	West Africa 7½ years; present tour 7 months; very temperate.
57	H. P. W., male, age 34, European, dark hair, florid complexion, marine superintendent. Aug. 20.	Lagos. See No. 48...	See No. 48 ...	See No. 48 ...	See No. 56 ...	West Africa 10 years; present tour 6 months; very temperate.
58	Mrs. B., female, age 45, European, missionary. Aug. 20.	Eket. Close to the Qua Ibo river, surrounded by dense, swampy forest.	No record of previous cases. Two cases in 1912, both missionaries; and a third, also a missionary, has occurred since (April 4th, 1913). See also case No. 53, in a patient who had recently been at Eket.	Glossina, Tabanus, Chrysops.	Rainy season; period of diminished rainfall in the middle of the wet season. No records available.	West Africa 22 years; present tour 15 months.
59	G. D. R., male, age 28, British, dark hair, fresh complexion, inspector of telegraphs. Aug. 25.	Ibadan. "A rolling plateau, with low hills and hardly any virgin land." "North of Ibadan there is little real forest."	One case or more each year since 1907. One case in 1912.	Glossina, Tabanus, Hæmatopota, Myzomyia, Culiomyia, Culioides, &c.	Rainy season; period of diminished rainfall in the middle of the wet season; rainfall nil (average 2.89 in.), temperature: mean max. 85°3 F., mean min. 53°5 F. (?)	West Africa 4 years; 2 years in eastern Transvaal; present tour 11 months; teetotaler.
60	M. P., male, age 26, German, grey eyes, brown hair, merchant. Sept. 8.	Sapele, but lived at Koko, about 30 miles distant. See No. 51.	See No. 51 ...	See No. 51 ...	Rainy season; rainfall 15.98 in. (average 13.99 in.), temperature: mean max. 85°0 F., mean min. 65°3 F.	West Africa 2 years; present tour 2 years.
61	D. B., male, age 30, British, merchant. Nov. 15.	Ikom, to the north and north-east dense forest, to the west undulating and grass covered, to the south and south-east hilly.	No record of any previous case.	Glossina, Tabanus, Chrysops, Subpangonia, Hippocentrum, Hæmatopota, Mansonioides, Myzomyia, Rhipicephalus.	Dry season ...	West Africa 6 years; present tour 1 year.

Personal History.			Blackwater Fever.					
Previous Illnesses, Malaria, &c.	Previous attacks of Blackwater Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of Onset and Onset of Jaundice.	General Symptoms.	Duration of Hæmoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and result.
Severe attack of malaria at Sierra Leone in 1908.	None ...	10 grains just before attack.	10 p.m. ... Second day of illness.	Fever and vomiting on July 28th; later took 10 grains quinine, which he vomited. At 10 p.m. a rigor, and some black urine said to have been passed. Next morning urine was normal. At 6 p.m. 10 grains euquinine taken and retained; at 10 p.m. another rigor and hæmoglobinuria; headache, severe vomiting, pains in the stomach, but no diminution of urine.	2 days	6 days	Negative.	7 days. Recovery.
—	None ...	Doubtful if any quinine taken as a prophylactic. 10 grains.	3 p.m. ... Immediate.	On August 2nd, when on board ship, an attack of "ague." Much better next day. Return of fever on August 4th with vomiting, and at 3 p.m. passed a large quantity of black urine. Admitted to Onitsha hospital on August 5th. Severe pains in loins, fever, hæmoglobinuria and marked suppression of urine.	3 days	3 days	A few young parasites in the blood on Aug. 5.	5 days. Death.
Several attacks of malarial fever.	None ...	Irregular... First attack 6 grains; second attack 10 grains.	4 p.m. ... Slight jaundice after the second attack.	No severe symptoms. Hæmoglobinuria on August 11th, but urine cleared on the same day and remained clear until August 16th, when, after a dose of 10 grains quinine, the hæmoglobinuria returned, but only for a few hours.	A few hours on Aug. 11 and again on Aug. 16.	13 days	Negative.	14 days. Recovery.
Slight attacks of fever during last two weeks, and diarrhoea.	None ...	10 grains weekly. 15 grains a day for the last few days.	3 a.m. ... About 15 hours after the onset of hæmoglobinuria.	Admitted on August 20th, complaining of fever and diarrhoea. Hæmoglobinuria began at 3 a.m. on August 21st, and was accompanied by vomiting, rapid pulse, and laboured respirations. Suppression began at once and finally became complete. The last specimen of urine passed (on August 23rd) was clear. Profuse diarrhoea throughout, dark foul stools containing, latterly, blood and mucous shreds.	3 days	4 days	A few small ring-like sub-tertian parasites in a blood film taken just after the onset of the blackwater.	5 days. Death.
Many attacks of malarial fever.	One previous attack 12 years ago. The hæmoglobinuria lasted only a few hours.	Unable to take quinine regularly owing to its toxic effects. None.	11 p.m. ...	Onset of fever at 7 p.m. Temperature 103°F., shivering and vomiting. Hæmoglobinuria at 11 p.m. All symptoms disappeared within 24 hours.	24 hours	—	Negative.	48 hours; recovery; returned to Europe.
A good deal of "fever" during the last three months.	None ...	5 grains daily. 5 grains ...	12 p.m. ... —	Under treatment for fever with gastric symptoms from August 21st to 24th. On August 25th felt a little "chilly," and at midnight passed 10 ozs. of dark brown urine. Nausea, but no vomiting. Urine clear by noon on August 26th, and albumen free on August 27th. No tendency to suppression of urine.	12 hours	24 hours	Negative.	24 hours; recovery; invalided.
A slight attack of "fever" about once every four months.	None ...	Quinine taken only when unwell. 10 grains ...	4 p.m. ... Second day of illness.	Fever lasted 7 days, never above 101.5° F. Bowels rather free.	5 days	8 days	Negative.	9 days; recovery
Slight attacks of "fever," lasting a day or two, for the last few months.	None ...	Irregular... 20 grains...	Early morning. —	Fell ill on November 13th, temperature 104° F., took 20 grains quinine, but vomited during the night. November 14th—Again took 20 grains quinine and later vomited. Rigors all night. November 15th—In the morning urine observed to be black. The hæmoglobinuria cleared up in about four hours.	A few hours only (four)	—	—	14 days; recovery; invalided.

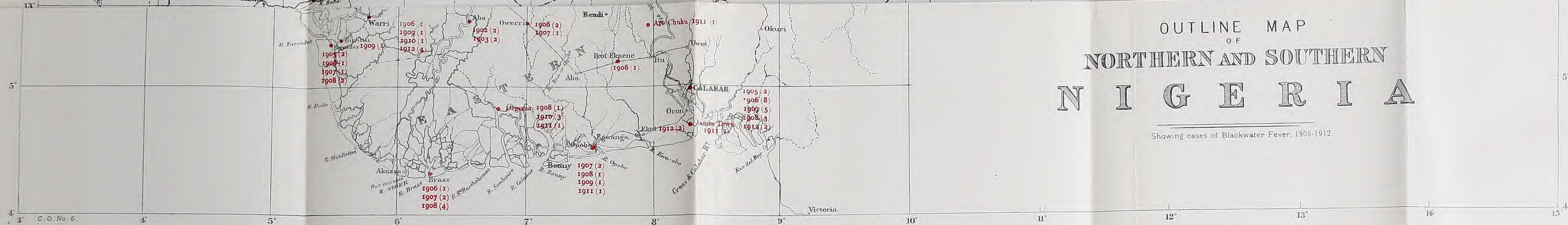
Case No.	Name, Description and Date.	Locality.				Seasonal variation and Climatic Conditions.	Service and General Habits.
		Station, Quarters and Physical Features.	Multiplicity of cases in the same place.	Insect Fauna.			
62	D. N., male, age 30, British, grey eyes, hair dark brown, missionary. Nov. 22.	Eket, no fixed residence, but working at various places on the Qua Ibo river. Low lying, swampy, covered by virgin forest.	See No. 58	...	Glossina, Tabanus, Chrysops.	Dry season; no records available.	West Africa 16 months; 6 months in South Africa; present tour 16 months.
63	F. L. C., male, age 30, European, hair black, complexion sallow, merchant. Nov. 24.	Onitsha, hilly and open country, patches of forest. The town is situated on Ozala hill on the River Niger, at an elevation of 200 feet.	One or more cases each year since 1907. No cases in 1911. One in 1912 (Case No. 55). Only incidentally at Onitsha.		Glossina, Tabanus; Culex, Mansonioides, Myzomyia, Tæniorhynchus, Phlebotomus, Ctenocephalus, Rhipicephalus, &c.	Dry season; rainfall 0.47 in. (average 0.80 in.), temperature: mean max. 92° F., mean min. 74° F.	Present tour 2½ years: careless in exposing himself in the sun without proper head covering.
64	W. M. C. male, age 43, British, eyes brown, hair and complexion dark, planter. Nov. 30.	Sapele. See No. 51	See No. 51	...	See No. 51	Dry season; rainfall 2.80 in. (average 2.65 in.), temperature: mean max. 88° F., mean min. 65° F.	West Africa 2 months in 1911; 4 years in India; 8 years in West Indies; present tour 4 months.
65	J. T., male, age 46, British, mercantile marine, master, s.s. "Mendi." Dec. 4.	Calabar. See No. 53	See No. 53	...	See No. 53	Dry season; the month of lowest rainfall; rainfall 1.32 in. (average 0.46 in.), temperature: mean max. 89° F., mean min. 73° F.	Had sailed to and from the West Coast for 24 years; had also sailed to India, &c. Present tour, a few days only this voyage.
66	H. S. T., male, age 30, European, blue eyes, fair complexion, merchant. Dec. 5.	Lagos. See No. 48	See No. 48	...	See No. 48	Dry season; the month of lowest rainfall; rainfall nil (average 1.32 in.), temperature: mean max. 88° F., mean min. 74° F.	West Africa 7 years; present tour 9 months; temperate in every way.
67	P. G. W., male, age 37, European, hair dark brown, eyes brown, foreman. Dec. 19.	Warri. See No. 50	See No. 50	...	See No. 50	Dry season; the month of lowest rainfall (average 0.47 in.).	Present tour 5 months; teetotaler.
68	C. M., male, age 29, British, eyes brown, hair dark brown, complexion sallow, merchant. Dec. 28.	Warri. See No. 50	See No. 50	...	See No. 50	Dry season; average rainfall for December 0.47 in., the lowest for the year.	West Africa 9 years; present tour 20 months. Very temperate in every way, but careless in his use of a mosquito curtain.

Personal History.			Blackwater Fever.					
Previous illnesses, Malaria, &c.	Previous attacks of Black-water Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of Onset and Onset of Jaundice.	General Symptoms.	Duration of Hæmoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and result.
Typhoid and dysentery in South Africa; several mild attacks of malaria and one attack of dysentery in West Africa.	None ...	5 grains daily. 5 grains ...	8 a.m. ... Just after the initial rigor.	Patient just recovering from a severe attack of dysentery. Severe rigor at 8 a.m. on November 22nd, temperature 106° F., vomiting, hæmoglobinuria at 11 a.m. Temperature remained high until 23rd, when it fell, and was accompanied by a clearing of the urine.	36 hours	60 hours	Negative.	Recovery. Returned to Europe.
Many minor attacks of malarial fever.	None ...	Irregular... 5 grains ...	4 p.m. ... Second day of illness.	For the last three months has not enjoyed good health. Took 5 grains quinine on the morning of November 24th, at 4 p.m. passed 20 ozs. dark-coloured urine, but nevertheless went out and played golf. On his return he passed 8 ozs. of urine the colour of stout. Complained only of a heavy feeling in the pit of the stomach. November 25th—Restlessness, vomiting, and hæmoglobinuria, but no reduction of the amount of urine passed. November 26th—Urine began to clear.	38 hours	4 days	Parasites found on the second day of the disease. Marked anæmia.	4 days: recovery; invalided.
Many attacks of malaria in the West Indies; some slight fever for three weeks before this attack.	None ...	5 grains daily. 15 grains in 2 doses, and 30 grains the day before.	2.30 p.m. ... Second day of illness.	November 29th—Fever, vomiting and diarrhœa. November 30th—Seemed better, but at 2.30 p.m. black water was passed. November 31st—The urine began to clear at 10 a.m., and was passed freely.	24 hours	26 hours	—	7 days; recovery
Several slight attacks of "fever"; had been feeling unwell for 3 months before attack.	None ...	A fairly regular quinine taker.	—	Unwell for three months. On December 4th had a rigor, with vomiting and hæmoglobinuria. On December 9th removed from his ship, R.M.S. "Mendi," to Calabar hospital. Recovery uninterrupted.	5 days	5 days	No malarial parasites found; pigmented leucocytes present.	20 days; recovery; returned to England.
Suffers from chronic colitis; several attacks of fever during the last month.	None ...	Only takes quinine when he has fever. 10 grains.	Early morning. Second day of illness.	Vomiting and diarrhœa during the night, noticed the blackwater in the morning. diarrhœa troublesome, due to an old-standing colitis.	3 days	5 days	Negative.	24 days; recovery
Seven short attacks of fever.	None ...	5 grains every other day. 5 grains.	6 a.m. ... Coincident with the onset of hæmoglobinuria.	No initial rigor, but sleepless and restless. Vomiting never severe. Abundant urine passed throughout. Urine began to clear at once after the first passage of blackwater, but became worse again the next day before finally clearing.	4 days	5 days	No malarial parasites. Leucocytosis at first. Hæmoglobin 80%.	5 days; recovery; invalided.
Several severe attacks of malarial fever.	None ...	Refused to believe in quinine as a prophylactic.	6 p.m. ... Deeply jaundiced on admission, and said to have been jaundiced the day before he fell ill.	Severe rigor just after playing golf, with vomiting and black urine. Fever did not fall until just before death. Urine abundant until the early morning of January 1st, 1913, when suppression set in. Collapse and death at 11.15 a.m.	5 days	5 days	No malarial parasites. Some leucocytosis. Hæmoglobin 60%.	5 days. Death.

SKETCH MAP OF SIERRA LEONE

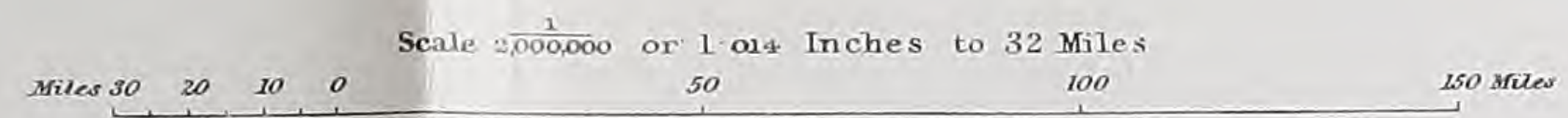






Reference

- International boundary
- Provincial
- Sub-provincial
- Customs Station
- Telegraph line
- Railway
- Projected Railway
- Approximate heights in feet above mean sea level



Printed at the Ordnance Survey Office, Southampton, 1915.

SKETCH MAP OF THE UGANDA PROTECTORATE

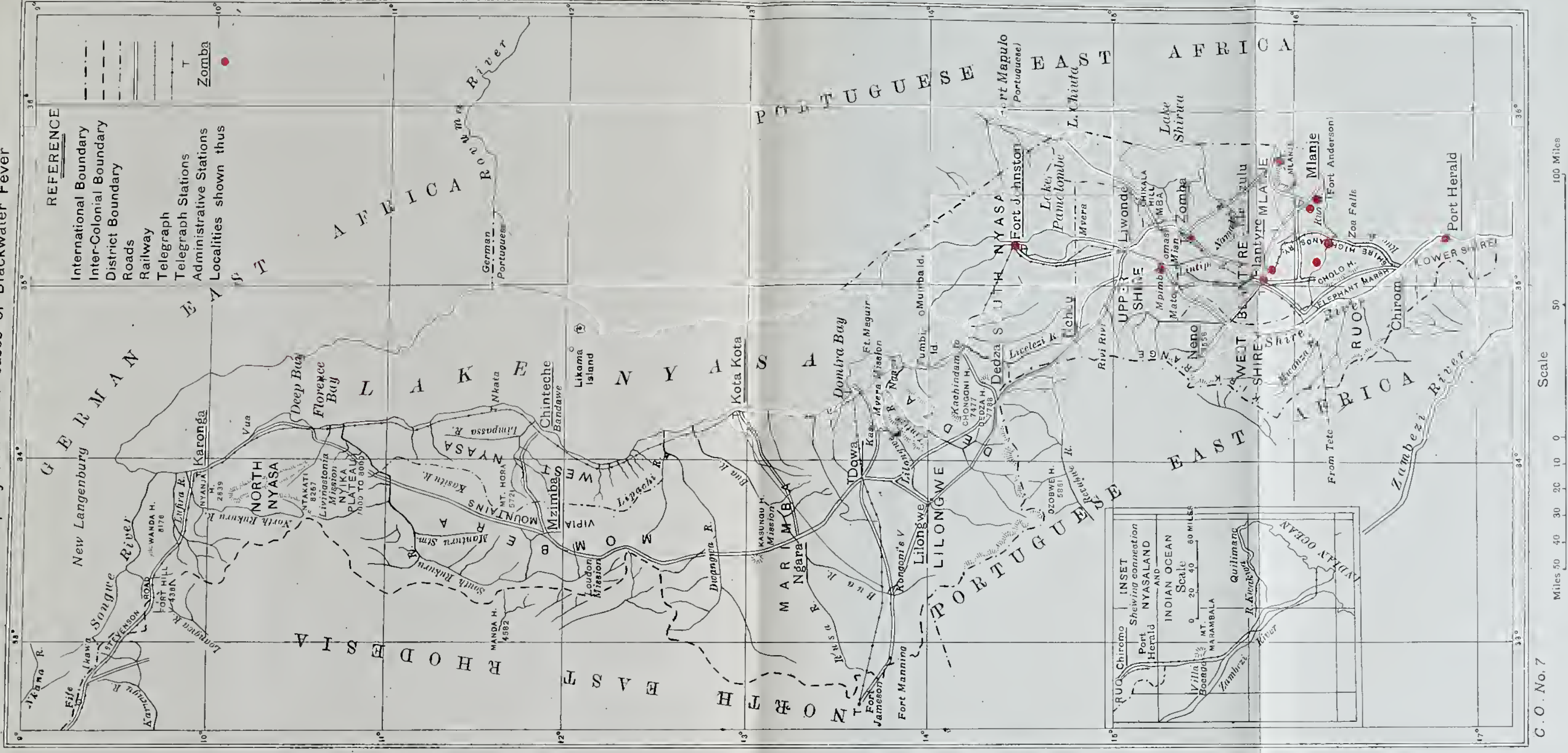
To accompany return of cases of Blackwater Fever

Appendix 1

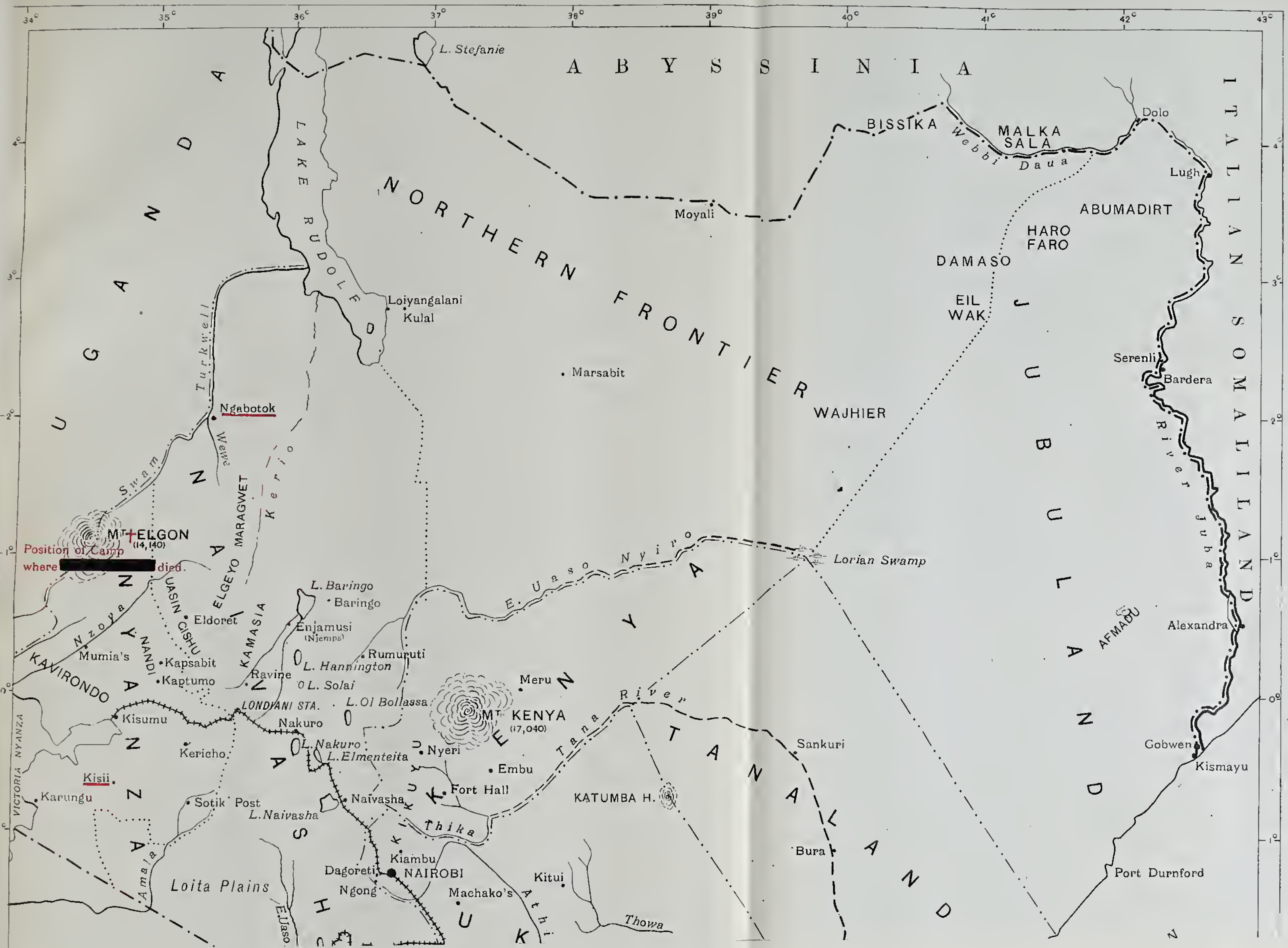


SKETCH MAP OF NYASALAND PROTECTORATE

To accompany return of cases of Blackwater Fever







AFRICA.

BLACKWATER FEVER IN THE TROPICAL
AFRICAN DEPENDENCIES.

REPORTS FOR 1913.

(For Reports for 1912 see [Cd. 7211], January, 1914.)

Presented to both Houses of Parliament by Command of His Majesty.
February, 1915.



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BLACKWATER FEVER IN THE TROPICAL AFRICAN DEPENDENCIES.

REPORTS FOR 1913.

Early in 1911 the following despatch was sent by the Secretary of State to the Governors of all the British dependencies in East and West Africa, with the exception of Somaliland :—

SIR,

Downing Street, 24 January, 1911.

It has been suggested by the Advisory Medical and Sanitary Committee for Tropical Africa—and I entirely concur in the suggestion—that, owing to the prevalence of blackwater fever in the Dependencies of Tropical Africa, it is desirable to collect all information bearing on this disease in order to throw as much light as possible on its nature and causation.

2. The opinions of medical authorities are divided as to whether the disease is directly related to malaria or whether it is a separate disease which is produced by a specific organism, not yet recognised, and which is possibly contracted in particular localities or buildings under certain conditions.

3. At present the conditions favouring the incidence of blackwater fever are not thoroughly understood; and it is possible that, by the collation and careful study of all cases which occur, some light may be thrown on this important subject and means suggested to prevent or diminish its occurrence.

4. With this object, therefore, I have to request that a special report may be forwarded annually by the Principal Medical Officer on all cases of blackwater fever occurring within the year in the Colony, attention being particularly paid in the report to the following points :—

I. *Locality* :

- (a) Physical features (*e.g.*, swamps, bush, forest, &c.).
- (b) Occurrence of a series of cases in any one place, particularly in any one building, specifying dates and relation to native dwellings and intercourse.
- (c) Insect fauna : particularly biting or sucking insects, such as mosquitos and biting flies, ticks, bugs, lice, fleas, &c. Specimens should be obtained and identified where possible.

II. *Seasonal Variation* :

- (a) Marked or unusual climatic conditions.

III. *Personal History* :

- (a) Medical history of patient (*e.g.*, previous diseases, attacks of malaria, habits regarding quinine taking, &c.).
- (b) Previous movements of patient and personal conditions to which he has been subject.
- (c) Microscopic examination of the blood (noting relation of examination to stage of illness).

5. It would be a great advantage if a map could be supplied with the report, showing the occurrence of cases in the various localities.

I have, &c.,

L. HARCOURT.

The replies were published [Cd. 6514] and presented to both Houses of Parliament. The report from Southern Nigeria was not included in the above Command paper, but was published separately.

The reports on blackwater fever for the year 1912 were published in the Parliamentary Paper [Cd. 7211]. The report for Nyasaland corresponded with the financial year 1912-13, to the end of March of the latter year.

The present paper contains the reports for 1913. The report for Nyasaland was prepared on the basis of the Calendar year, but the reports on the cases which occurred in the first quarter of the year, and which were included in the report for 1912-13, are not reprinted.

Medical men entitled to speak with authority on the subject of blackwater fever have criticised the form and substance of these annual reports, and it is proposed to introduce considerable changes in both respects. It will necessarily be some time before these changes can take effect.

GOLD COAST.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 23rd March, 1914.)

SIR,

Government House, Accra, 3rd March, 1914.

I HAVE the honour to transmit, herewith, in duplicate, a copy of a letter from the Acting Principal Medical Officer, covering reports on nineteen cases of blackwater fever which occurred in the Gold Coast and its dependencies during the year 1913.

I have, &c.,

H. BRYAN,

Deputy Governor.

Medical Department,

SIR,

Victoriaborg, Accra, 26th February, 1914.

I HAVE the honour to forward, for your information and transmission to the Secretary of State, the Clinical Reports, &c., of nineteen cases of blackwater fever that occurred in this Colony and Ashanti during the year 1913; no case was reported from the Northern Territories.

2. Two fatal cases were reported, but as the patients were not attended by a Medical Officer, I was unable to procure any details of the illness.

3. It is difficult to account for the marked increase in the number of cases which occurred during 1913; although there was an increase in the number of cases, the disease appears to have run a mild course in the majority of cases compared with previous years. The following table shows the number of cases and death-rate since 1910 in blackwater fever cases:—

Year.					Cases.	Deaths.	Death rate per 1,000 cases
1910	..	...	...	...	20	10	500·00
1911	...	...	...	...	14	6	428·57
1912	...	...	...	...	13	6	461·53
1913	...	...	...	...	21*	7	333·33

* *Vide* paragraph 2, *supra*.

4. I regret I have been unable to furnish maps and temperature charts in all of the cases.

I have, &c.,

E. H. TWEEDY,

Acting Principal Medical Officer.

The Honourable
the Colonial Secretary,
Victoriaborg, Accra.

CASE 1.

REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

European (non-official), age 34.

I. *Locality*.—

(a) Residence in centre of business portion of Coomassie. Swamp, partly drained, on two sides of town, nearest less than half-mile off.

Beyond the swamps, forest, partly cleared for some distance.

(b) A case in the same building and same bedroom occurred about eight months previously. Only one other recent case in Coomassie. No native dwellings in vicinity excepting those of servants to Europeans.

(c) House and surroundings carefully searched for insect fauna. Nothing seen; a few *stegomyia* mosquitoes.

II. *Seasonal variation*.—

Hot end of dry season. One or two tornadoes recently. Normal climatic condition for the time of year.

III. *Personal history*.—

(a) Patient has been on the Coast about 13 years, with regular periods of leave. Has had fever fairly often. Generally taken quinine regularly, but has recently been rather irregular.

(b) Patient has been six months in Coomassie this tour, coming direct from England. Has had poor health for about two months. Had some fever and intestinal troubles recently, culminating in a severe malarial attack on the 19th March.

Microscopical examination of blood made on the 24th March.

Result.—Large numbers of crescents found. No other forms of parasite.

Differential leucocyte count.—

	Per cent.
Large mononuclears...	23
Small	15
Polymorphonuclears	52
Eosinophiles	5
Transitionals, &c.	5
Many megaloblasts.	

Ova of *Trichocephalus dispar* found in fæces.

Previous history.—Has had malaria fairly often, and has been in poor health for two months.

Has not been very regular in taking quinine.

On 14th March had two or three days' severe pain in region of appendix, which disappeared on treatment.

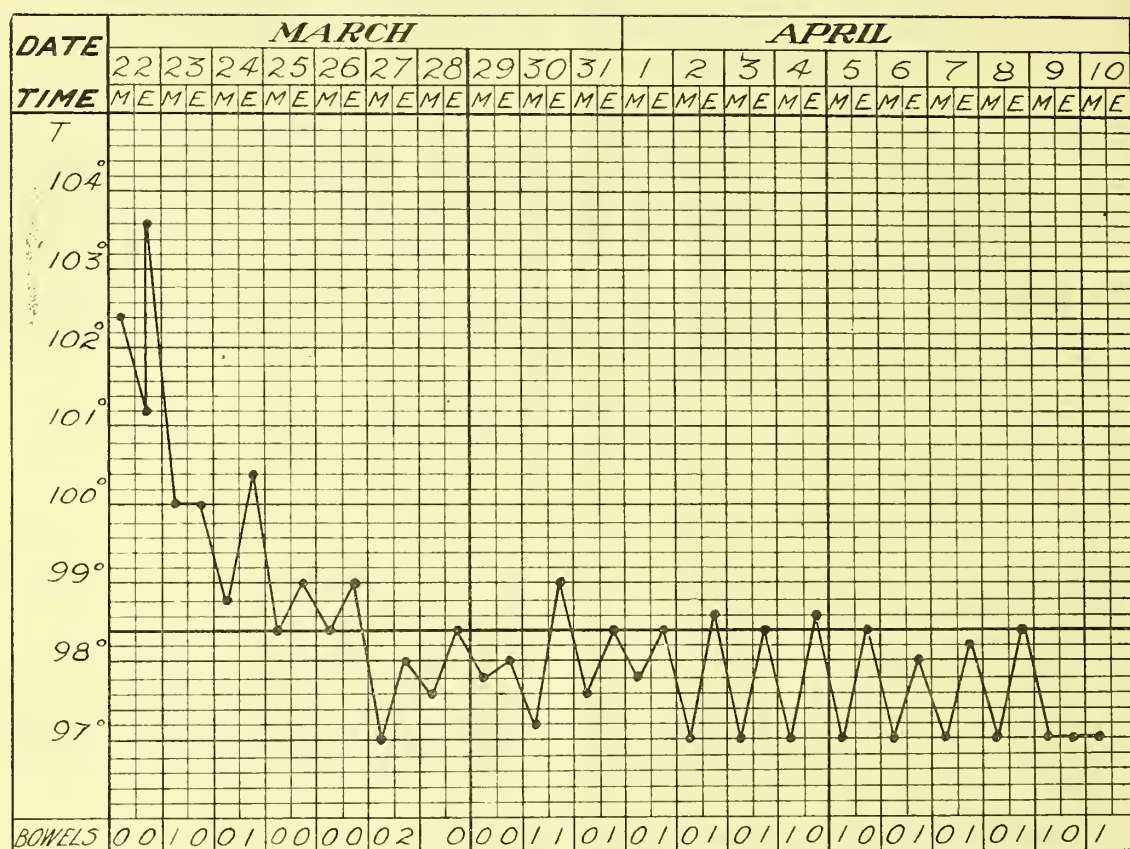
On 18th had a sharp attack of fever; was not seen till morning of 19th, when temperature was 103°, patient vomiting frequently, and feeling very ill.

Spleen and liver both tender.

Took 10 grains quinine on 18th, 15 grains on 19th, and 15 on 20th, all in liquid form.

Temperature normal on 20th, and patient got up 21st, feeling much better, looking very pale and a little yellow. 10 grains quinine. On morning of 22nd had

fever again, and sent for Medical Officer; passing very dark urine just before he arrived.



On admission to hospital.—Temperature, 102.4°. Pulse, 90.

Passing very dark urine, almost black in appearance, but translucent against light. Heaviness and slight aching in loins. Vomiting almost everything taken at first, but keeping down "Perrier" water if iced.

Urine passed during day, 60 ozs. Evening temperature, 103.6°.

23rd. Urine a little lighter, about burgundy colour. Pulse rapid.

Yellow colour very marked. Still inclined to vomit.

Urine during day, 55 ozs.—some lost with stool.

24th. Improved. Pulse good. Yellow colour still marked.

Taking large quantities of fluid, only vomited three or four times. Urine passed, 54 ozs., distinctly lighter in colour.

25th. Temperature nearly normal. Pulse good. No vomiting.

Urine very much lighter in colour. Has taken egg-flip, champagne, and Perrier. Yellow colour is still very marked. Urine passed, 32 ozs.

26th. Urine now almost clear. Pulse and temperature normal. Urine, 33 ozs. Hæmoglobin, 50 per cent.

29th. Commenced quinine in iron tonic. Half-grain three times a day. Is now convalescent. Yellow colour rapidly disappearing.

1st April. On full diet. Quinine increased to three-quarter grain three times a day. Hæmoglobin, 55 per cent.

5th April. Continues to gain strength. Quinine increased to one grain three times a day.

10th April. Patient left hospital to proceed to England. Quinine, now one and a half grains three times a day. Yellow colour has disappeared.

J. C. S. McDouall,
Medical Officer.

CASE 2.

REPORT ON A CASE OF BLACKWATER FEVER AT ACCRA.

European (non-official).

I. *Locality*.—

- (a) A market in the midst of the native town.
- (b) Suspicious native cases reported in neighbourhood.
- (c) Mosquitoes :—
Anopheles.
Stegomyia.
Culex.

II. *Seasonal variations*.—

Commencement of rainy season; storage of drinking water in neighbouring houses for days, and consequent increase of mosquito breeding.

III. *Personal history*.—

(a) In West Africa nine years. Always enjoyed good health until last return to Colony in November, 1912. Since then subject of frequent attacks of dyspepsia; one attack of dysentery. Lues at age of 21.

(b) and (c) Fever since 1st April; on 2nd and 3rd took 5 grains quinine.

DETAILED REPORT.

European (non-official), age 33.

Lues at age of 21.

Takes quinine in doses of 3 to 4 grains a day "with fair regularity."

Fever since 1st April; on 2nd and 3rd took 5 grains quinine.

At 9 a.m., 4th April, a rigor, temperature, 103° ; pulse, 80; some jaundice, constipation, epigastric pain, but no vomiting. Urine, very dark brown colour, with tinge of bile, hardly any sediment. On boiling, coagulated albumen occupied one quarter of tube.

After 10 a.m. vomited two or three times slightly bile-stained fluid.

6 p.m.—Temperature, 101° ; pulse, 74; no injection of eyes or flushing of face. Scleræ distinctly icteric. Tongue rather dry, a dirty brown, but cleaner at tip and edges. Slight tenderness in epigastrium and right hypochondrium.

7 p.m.—Rigor, temperature, 102.2° .

Laboratory report.—

- (1) Urine :—Numerous granular tube casts.
No cellular elements.
Much brown granular debris.
Guaiacum test positive.

(2) Blood :—

						Per cent.
Polymorphonuclears	...	...	...	...	...	82.2
Lymphocytes	...	...	...	...	...	11.0
Mononuclears	...	...	...	...	...	6.4
Transitionals	...	...	...	...	...	0.4

5th.—Temperature and pulse normal. Urine clearing. Albumen after boiling $12\frac{1}{2}$ per cent. of tube. Bowels have acted freely. Quantity of urine, 33 ounces. No albumen at night.

6th.—Temperature and pulse normal. Urine, 53 ounces. No albumen.

7th.—As on 6th. Urine, 84 ounces, faint trace albumen.

Laboratory report.—

Blood :—

	Per cent.
Polymorphonuclears	61·2
Lymphocytes	18·4
Mononuclears	16·2
Eosinophiles	2·2
Transitionals	0·6
Mast cells	0·4

8th.—Much better; scleræ clearing; tongue clean. Urine, 61 ounces, no albumen.

9th.—Quite comfortable. No jaundice; urine, no albumen.

10th.—*Laboratory report on blood* :—

	Per cent.
Polymorphonuclears	60·0
Lymphocytes	24·4
Mononuclears	11·0
Eosinophiles	3·2
Transitionals	1·2
Mast cells	0·2

No parasites. No pigment.

11th.—Discharged.

Treatment.—Rectal salines first two days, later ordered iron tonic.

Remarks.—Diagnosis somewhat uncertain. The firm's premises face the market place, which is situated in the town of Accra, and is surrounded by native dwellings. Of the six other European employes, none suffered from any other similar illness at that time or after.

C. V. LE FANU,
Medical Officer.

CAPE COAST.

I. *Locality.*—

Cape Coast is a remarkably well-drained town, and free, to a very great extent, from mosquitoes and sand flies and other biting insects.

II. *Seasonal variation.*—

This year has been a remarkably wet one, on nearly one-third of the days of the last six months rain has fallen. The previous year had been very dry.

CASE 3.

Child (non-official), age 4.

Previous illnesses.—

Hæmoglobinuria two years ago; uninterrupted recovery, and no other symptoms.

Malaria.—Occasional attacks of fever.

Previous movements.—Has stayed all his life in Cape Coast.

History.—Passed coffee-coloured urine at early morning. No pain nor tiredness. Feels perfectly fit.

Examination showed enlarged, palpable spleen. No jaundice. Looks perfectly well.

Urine.—Hæmoglobin.

Disintegrated red cells.

Albumen plentiful.

Granular debris.

No sugar, bile, &c.

Blood.—No parasites.

Leucocytes normal.

Fæces.—*Ascaris* ova numerous.

Given lot. hyd. perch. m X., sod. bicarb., gr. V., t.i.d., and told to lie up.

Progress.—Ran about the whole time, as he would not stay in bed. Urine cleared by second day, and no symptoms supervened.

CASE 4.

REPORT ON A CASE OF BLACKWATER FEVER NEAR KIBBI.

European (non-official), age —.

I. *Locality*.—

(a) A plantation situated some miles from Kibbi and about 770 feet above the sea-level.

The ground is swampy in parts even in the dry season. The swampy ground is for the most part situated near the banks of a good-sized river which forms the boundary of two sides of the plantation. The rest, and the major part, of the plantation is not swampy. The bungalow where the patient lives, with his wife and another European, is a new wooden building on piles—it is built on the summit of an elevation which rises abruptly to a height of 130 feet above general level of the plantation. The natural drainage is excellent.

The ground around the bungalow is cleared for about 200 yards on all sides of bush, &c. Beyond this clearing on two sides is bush and forest, and on the other sides is the plantation.

(b) No record of any other case of blackwater fever in proximity could be obtained.

(c) *Insect fauna*.—Mosquitoes are very few and far between at the bungalow. I could find none during the two nights I slept at the house. Both anopheles and stegomyia are to be found on the town ground of the plantation.

Sand flies are prevalent during the early morning and before sunset.

Yall flies are very prevalent at certain seasons of the year.

II. *Seasonal variation*.—

The present year has been an exceptionally dry one during the early months. the rains not commencing until the middle of May, by which time the patient was convalescent.

The average yearly rainfall, as taken on the plantation, is as follows, viz.:—

1908.—70·80 inches.

1909.—80·19 „

1910.—89·98 „

1911.—61·03 „

1912.—51·06 „

1913.—Very slight up to the middle of May.

III. *Personal history*.—

(a) Patient is a planter. He is 35 years old. Thin and dark, with sallow complexion and brown eyes. He has been on the Coast for 5½ years, during the first four of which he went home at yearly intervals for four months at a time.

The length of his last stay at home was about three months, and the length of his present tour to the date of onset of blackwater fever 5 months.

Habits are temperate.

Quinine prophylaxis very irregular.

During his first tour on the Coast patient had one attack of malaria, during his second tour he had fever three or four times, and in his third tour he had some twenty separate attacks of fever, probably malaria.

He has never suffered from blackwater fever previous to present attack, either in Europe or on the Coast.

Present attack of blackwater commenced on May 1st, and patient took ten grains of sulphate of quinine when he first felt ill, and about twelve hours before any definite symptom of the disease showed itself.

Jaundice was apparent on the second day of the disease and lasted for about five days after temperature had become normal—thirteen days in all.

Hæmoglobinuria lasted five to six days.

Albuminuria lasted for twelve days.

Duration of disease.—Twelve to thirteen days.

Result.—Recovery.

History of attack.—On May 1st patient says he felt perfectly well in the morning, doing his work as usual, but on coming home in the middle of the day noticed that he felt no appetite for his food. During the afternoon he suffered from headache and a touch of fever, and before going to bed he took 10 grains of quinine sulphate. Patient passed a very bad night owing to severe headache and feeling of nausea.

Second day.—Patient noticed on passing his water that it was “almost black,” and in the course of the morning his wife noticed that his eyes were yellow-looking. I saw the patient for first time about 6.30 p.m., when jaundice was very noticeable. The temperature was $103\cdot4^{\circ}$ and the pulse 115. There was tenderness on light pressure over the hepatic region, marked pain and tenderness over the epigastrium, and he complained of persistent feeling of nausea, with occasional vomiting of “bile.” There was no tenderness, either then or subsequently, over the region of the kidneys. Urine was passed freely throughout the illness and in normal quantities.

Third day.—The morning temperature was $102\cdot8^{\circ}$, and evening temperature 103° , with a small pulse of 120. Jaundice very pronounced, and urine typical. The vomiting and epigastric pain was worse, large quantities of a clear bilious-looking fluid being brought up independently of food being taken. Only teaspoonful feeds of champagne, chicken broth, &c., could be retained. Mental condition clear.

Fourth day.—The morning temperature was 101° and evening temperature 102° , pulse in each case 115. Skin was moist, and other symptoms remained the same. Patient passed a better night after one-sixth grain of morphia.

Fifth day.—Temperature $99\cdot4^{\circ}$ and pulse 97. Jaundice clearing up, and urine lighter in colour. Epigastric pain and vomiting also better.

Sixth day.—The improvement in all the symptoms continued, and from this time the patient's condition improved rapidly, and he made eventually a complete recovery with no relapse.

Treatment.—Consisted of five grains of calomel the second night. Enema was used subsequently. Hot dry applications to the loins, saline injections (rectal). Mustard plasters to epigastrium, &c. No quinine was given.

(b) *Previous movements of patient.*—During the five and a half months of his present tour patient has lived entirely at the plantation with the exception of a short visit to Accra and Mangoase about six weeks before the onset of the disease.

(c) Nil.

T. A. DOWSE,
Medical Officer.

CASE 5. (*Vide also* CASE 18.)

REPORT ON A CASE OF BLACKWATER FEVER AT CAPE COAST.

(Non-official), age 33.

I. *Previous illness.*

Lues three years ago.

Blackwater four years ago when travelling home to England after invaliding for remittent malaria.

Malaria, constant attacks.

II. *Previous movements.*—

Has been in Cape Coast for seven months past. Bungalow away from town, but office is in middle of town, and surrounded by native shops and houses.

History.—Patient had taken very little quinine for some months, and that spasmodically, when he felt slight attacks of fever. On Tuesday, 6th instant, he had an attack of fever, with vomiting (six times). No headache. Bowels costive.

On Wednesday he felt better, and vomiting was less.

He went to the office on Thursday, and on Friday afternoon the fever started at midday, with vomiting in evening. This continued till Sunday afternoon, 11th, when he sent for Medical Officer. Headache during this period, and bowels well opened by some purgative pills.

Condition when seen: Temperature, 101.2° . Pulse, 108. Head, dull. No pains elsewhere. Liver enlarged. Spleen not palpable. Vomit showed a considerable amount of bile. Urine, high-coloured. Treatment: Quinine, grains X., that evening, and grains V. t.i.d. on Monday, when temperature and pulse were normal, and patient felt quite well, and got up in morning for two hours. Tuesday, grains V. t.i.d., and felt well till evening, when at 5 p.m., he had an attack of fever and temperature went up.

At 2 a.m. in the morning he passed urine black in colour. He vomited three times, bilious green with slight traces of blood; no rigor.

Condition at 11 a.m.: Temperature, 98; pulse, 72, firm and well sustained; felt very weak. Eyes jaundiced, but skin normal. No headache. Tongue moist and clean. Slight tenderness over left kidney.

Urine.—Hæmoglobin.

A few red blood corpuscles.

Slight trace albumen.

S. G. 1012.

Bowels had moved once.

Removed to hospital 3 p.m. and stood the journey well.

Temperature, 98° ; pulse, 84; but he looks very ill. Hot sand bags applied to small of back, which produced copious sweating. Urine passed freely, Perrier water being drunk plentifully.

Blood showed no parasites. Leucopenia present.

Progress. May 15th.—Sleep rather disturbed, but feels better. One motion, loosely formed, and smelling rather strongly. Tenderness over kidney absent, and jaundice of eyes less. Has had no vomit nor rigor. Urine passing freely and colour lighter, with less hæmoglobin present. Albumen in slight amount. No casts.

Evening.—Urine plentiful. No vomit nor pain.

May 16th.—Sleep disturbed, urine normal.

May 17th to 24th.—Improvement continuous. Sleep good, and urine normal.

May 25th.—Evening temperature, 101.4° ; pulse, 100. Bilious vomit and tenderness over epigastrium.

Blood shows subtertian rings.

Urine high-coloured, but no albumen nor hæmoglobin.

May 26th.—Still febrile, with bilious vomiting.

Quinine, 2 grains morning and evening.

May 27th.—No vomit, but sleep disturbed and fever high in evening. Quinine, 12 c.m. given hypodermically at night.

May 28th.—Much better this morning. No fever to-day. Quinine, grains III. t.i.d.

May 29th to June 2nd.—Improvement continued, and patient discharged with instructions to take grains III. quinine daily.

Treatment during stay consisted in hot sand packs, abundance of Perrier water.

Liq. hydrarg. perch. 5 ss., sod. bicarb. grains X., four-hourly; and bowels kept open.

H. F. HAMILTON,

Medical Officer.

CASE 6.

REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

(Syrian trader), age —, female.

I. *Locality.*—

(a) Residing about quarter mile away from the swamp of Subin. No bush or forest near.

(b) No history of any other case occurring in the house. Patient lives—with many other Syrians—above a native store. Native dwellings all around, and extensive intercourse with natives.

(c) Larvæ of anopheles found in the swamp of Subin.

No fleas seen, but they are probably present.

II. *Seasonal variation.*—

Commencement of rainy season.

Rainfall below average for the time of year.

III. *Personal history.*—

(a) Has had several attacks of malarial fever previously.

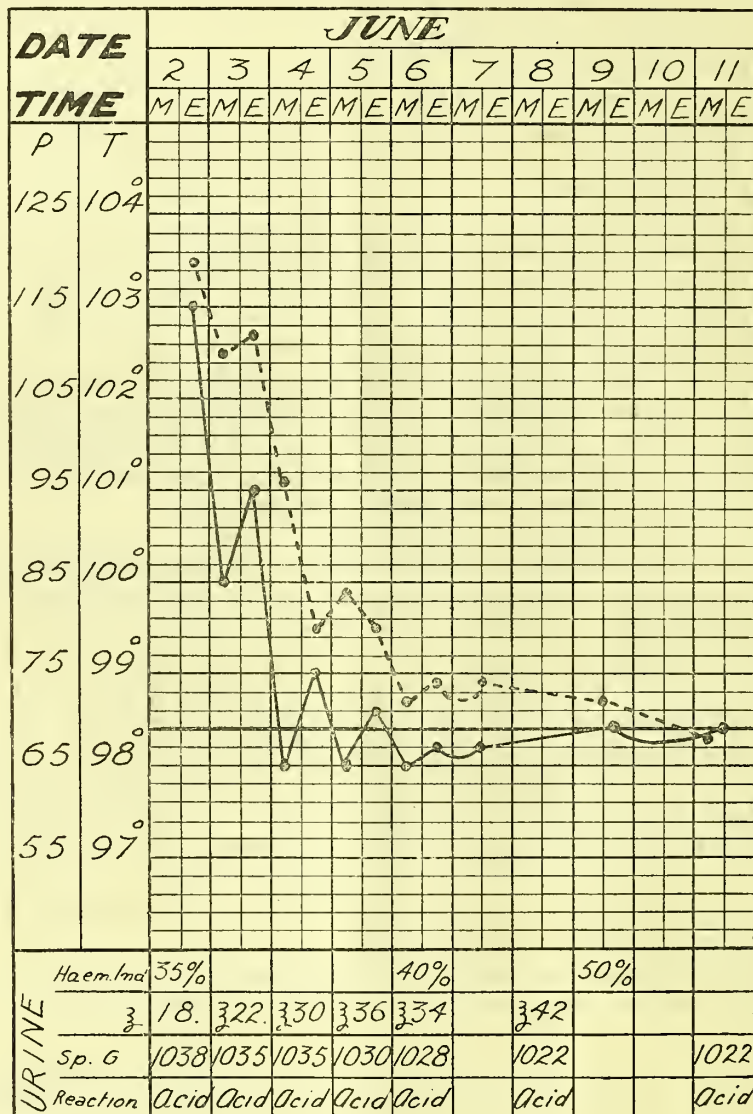
The patient was not in the habit of taking quinine as she is pregnant (five months) and feared abortion.

Frequently had small attacks of fever, but only took quinine when the attack was very severe.

Had never had blackwater fever before.

(b) Patient had been in West Africa for one year only, and only one month in Coomassie. Had previously resided at Abosso.

(c) At no time did a microscopical examination of the blood show any malarial parasites or pigment, but the patient had taken large doses of quinine before I was called in.



I was called to see patient on the evening of the 2nd June, 1913. She had passed water which was the colour of stout, and complained of pain in the lumbar region.

She was very jaundiced. Had had no vomiting. She declined to come into hospital. Temperature 103° F. Pulse 120 and weak, respirations 30. The patient was five months pregnant. The temperature had fallen to 100° F. on the next morning, but rose to 101° F. that evening, after which it never rose above 99° F. Haemoglobin disappeared from the urine on the sixth day, and albumin on the seventh. The urine remained acid throughout. There was no suppression, the quantity passed during twenty-four hours varied from 18 ozs. on the second day to 42 ozs. on the eighth.

The specific gravity of the urine was 1038 on the second day, and gradually fell to 1022 during convalescence.

The haemoglobin index was at first 35 per cent., and never rose above 50 per cent. On the third day the patient was troubled with vomiting.

The case ended in recovery.

H. W. GUSH,
Medical Officer.

CASE 7.

REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

European (non-official), age —.

I. *Locality.*—

(a) Living about 300 yards away from the swamp of Subin. Bush within about 50 yards, and forest 200 or 300 yards away.

(b) No other case has occurred in the house, but ten days previously a case had occurred about 100 yards away. Intercourse with natives and native dwellings extensive and continuous.

(c) The larvæ of anopheles are found in the swamp of Subin. No other biting flies, &c., seen.

II. *Seasonal variation.*—

Beginning of rainy season.

Rainfall below the average for the time of year.

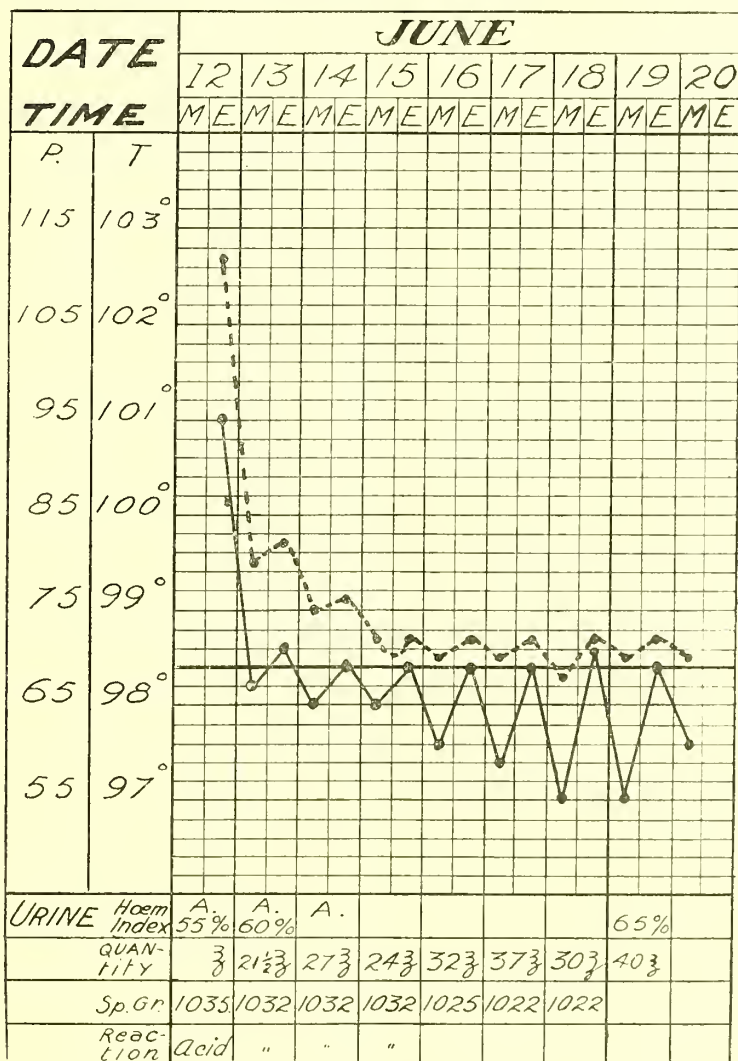
III. *Personal history.*—

This is the patient's second tour. The first tour consisted of five years' residence. He has now completed two years of his second tour. Has frequently had malaria. Has never had blackwater fever before. Never takes quinine regularly.

(b) Has resided in Cape Coast, Secondee, and Coomassie—the latter for the past two years. Has been overworking recently building a church.

(c) Dr. A. J. R. O'Brien examined the blood and at no time found malaria parasites—the patient had previously taken large doses of quinine—but the differential blood count suggests some protozoal infection.

It was as follows:—48 per cent. mononuclears, 5 per cent. transitionals, 1 per cent. eosinophils, and 46 per cent. polymorphonuclears.



I was called to see the patient on the evening of the 12th June, 1913. He had felt feverish and out of sorts for two days. The previous day he had taken 16 grs.

of quinine, and on the morning of the 12th he took 10 grs. At about 5 p.m. he passed a quantity of urine the colour of stout. I saw him shortly afterwards, his temperature was 102° F. Pulse 120, and respirations 30. He complained of tenderness over the hepatic area, and pain in epigastric and lumbar regions. He was moved into hospital. His temperature came down to normal the next morning and did not rise again. He was slightly jaundiced at first; there was no vomiting.

The quantity of urine varied from 21½ ounces during the first twenty-four hours to 40 ounces on the eighth day. Hæmoglobin and albumin had disappeared from the urine on the 5th day. The urine was acid throughout the disease, and the specific gravity fell from 1035 to 1022. The hæmoglobin index was 55 per cent. on the second day, and 65 per cent. when the patient left hospital.

The patient recovered, and left hospital on the ninth day.

H. W. GUSH,
Medical Officer.

CASE 8.

REPORT ON BLACKWATER FEVER AT CAPE COAST.

(Non-official), age 40.

I. *Previous illnesses.*—

Lues five years ago, resulting in hemiplegia. Treated salvarsan with complete recovery. Hg. inunctions still continued for one month in every three. Was using inunction at time of admission to hospital.

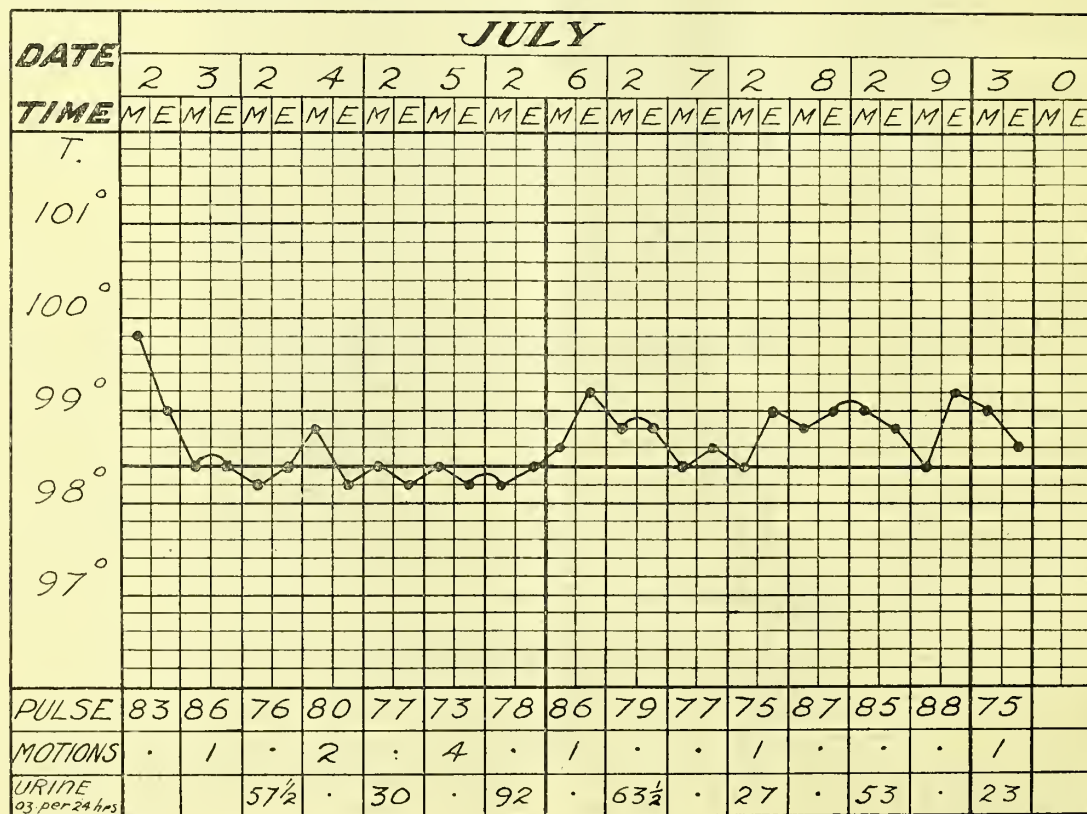
II. *Blackwater fever.*—

Four years ago, unconscious 48 hours. (Urine said to be bright red, then black.) Occurred in Portuguese Congo.

Dyspepsia constantly while on Coast.

Malaria.—Numerous attacks in previous life on Coast; none this tour.

Previous movements.—Has been all over Africa in last 20 years, with intervals in Greece. This is his first visit to the Gold Coast, and he has been out two months. Was in Accra three weeks. In a native village for next three weeks (badly bitten then by mosquitoes and other biting flies). For last two weeks in Sekondi in a house with an open stagnant gutter in front of it.



History.—No attacks of fever while in Gold Coast, but much troubled by dyspepsia. Food mainly bread and jam; for past two days has felt unwell and tired. Early this morning (July 23rd) he passed coffee-coloured urine. He walked up to hospital at once (7 a.m.).

Conditions.—Complains of tenderness in epigastrium, but none over kidneys. Appearance healthy, weight 15 stone. No jaundice; pustular rash on skin of arms and abdomen from mercury inunction. Gums and under surface of edges of tongue sore and ulcerated (mercurial stomatitis). Quinine taken is usually 3 grs. every two days. Given enema, hot sand packs to small of back, and :—

R Liq. hyd. perch. m 15.

Sodii bicarb., grs. X.

Liq. amm. acet. m. XL.

Aq. ad. \bar{s} i. \bar{s} i four-hourly.

Urine (first passed) :—

S. G. 1032, dark-brown coffee coloured.

Whitish deposit on standing.

Albumen moderate.

Trace of blood.

Bile in small amount.

No sugar.

Hæmoglobin dissolved in urine.

Microscopically.—Triple phosphates.

Urates.

Bacterium uricæ.

Casts. A few granular and fewer hyaline.

A few amœba-like cells.

Red blood corpuscles—mostly undergoing degeneration.

Blood (twelve hours after onset) :—

No parasites.

Differential count :—

	Per cent.
Polymorphonuclears	75
Large mononuclears...	23
Small „	2

Polymorphonuclears showed granules as of pigment. Large mononuclears badly stained, and with nuclei very loose and irregular and lightly stained (as if in a state of death).

Progress. July 24th.—Slept well. Feels well. Stomatitis troublesome; so stopped liq. hyd. perch. in mist.; given pot. chlor. and glye. ac. boric. mouth wash, and tinct. benzoin. co. inhalations. Urine nearly clear. Is habitually constipated, and requires drugs to keep bowels open.

July 25th.—Urine amber colour.

No bile, sugar, &c.

Faintest trace of albumen.

A few hyaline casts.

Fewer red cells.

Bladder epithelium.

Bacteria.

Blood :—

	Per cent.
Polymorphonuclears	66
Large mononuclears...	32
(Show signs of new formation.)	
Small mononuclears...	1
Eosinophiles	1

Thick film showed no parasites.

Sleep fair—but pain in mouth severe.

Blood (third day).—Increasing numbers of small mononuclears. Pigment granules in one large mononuclear.

July 26th to 29th.—Has felt well all along except for pain of stomatitis, which kept him from drinking as much Perrier water as he has for several days—

accounting for small amount of urine on these days (*vide* chart). It also affected sleep, and required morphia, $\frac{1}{2}$ gr., and atropine, gr. $\frac{1}{120}$, hypodermically on night of 28th.

Light diet started on seventh day, when he was allowed up for the first time.

A report since received reports uninterrupted recovery.

H. F. HAMILTON,
Medical Officer.

CASE 9.

REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

European (non-official), age 29.

I. *Locality*.—

(a) The case occurred in Coomassie, a town situated in a large clearing in dense forest, with some swampy ground in the lower parts. No bush or swamps in the immediate vicinity of the patient's residence.

(b) No series of cases occurred.

(c) No mosquitoes were found in the patient's house, but *Anopheles costalis* and *Stegomyia fasciata* were prevalent in the town.

II. *Seasonal variation*.—

The middle of a rainy season presenting no unusual features.

III. *Personal history*.—

(a) Patient had done a tour in Northern Nigeria, had blackwater fever, and was invalided home. Had had one or two mild attacks of malaria prior to this, but none since.

Professed to take regular doses of quinine, but admitted that he forgot or neglected it so often that he cannot be said to have taken more than occasional doses. Five-grain doses.

(b) Patient arrived on the Coast from England on the 24th of June, reached Coomassie next day, and was taken ill on the night of the 10th of August.

(c) The blood, at the commencement of the illness, contained numerous subtertian parasites. They disappeared within 36 hours, leaving a very marked anæmia. Few erythrocytes, with increase of the mononuclear and polymorphonuclear corpuscles, especially the former. Later, after apparent recovery and approaching convalescence, subtertian parasites again appeared.

Patient was formerly employed in Nigeria, but was invalided after blackwater fever in his first tour, last year. He landed in Sekondi on the 24th of June and reached Coomassie on the 25th. I first saw him for a moment about a week ago, and made a mental note that he would have to be watched, as he looked weak and anæmic, and it seemed doubtful if he would escape invaliding again. He was then given definite instructions about taking quinine, which, however, he does not appear to have carried out.

On the night of the 10th of August, after he had only been six weeks in the country, he had a rigor, and I found him with a temperature of 103.6° , but beginning to sweat. He said, on being questioned, that he had passed some "rather dark" urine, but it had been thrown away. He had already been given 10 grains of quinine in solution. The next morning his temperature was down to 100.8° , but he complained of severe headache, vomiting, and was passing scanty, practically black, urine. He was immediately removed to hospital.

(It was at this time that his previous history was elicited. He was evidently anxious to return to and remain on the Coast, and was apparently knowingly accepting the risk of doing so.)

Examination of the blood showed numerous parasites (subtertian ring forms) and quinine was administered, with a mixture of iodine, perchloride of mercury, and bicarbonate of soda in frequent small doses to combat vomiting, while he was encouraged to drink large quantities of soda and barley water. Sleeplessness was treated with trional. Although the urine cleared on the third day, it remained very scanty, only a drachm or two being passed at a time, which was so loaded with albumen as to be quite solid after boiling. Hot fomentations were kept constantly applied over the loins and liver, and saline injections given per rectum.

It was only after hypodermic injections of 1/100 grain of digitalin were added to the other means that the quantity of urine began to increase, and they were at one time given every two, but afterwards every four and eight hours.

By the 20th the patient's condition had so far improved that there seemed to be a reasonable prospect of his recovery. The blood was now free from parasites, and the erythrocytes, though greatly reduced in number, were increasing, and deformed and ghost forms absent. The urine was showing a daily increase and the patient was obviously better in himself. He was now taking Fellows's syrup and arsenic.

On admission the patient had been suffering from acne and prickly heat, and for many days the excretory functions had been performed mainly by the skin. Every effort was made to combat the effect of this by dusting powders, antiseptic lotions, &c.: but on the 1st September numerous small boils appeared, not only on the back, buttocks, flanks, &c., but on the forehead, round the mouth, &c., in fact, a more or less general eruption. The gums, too, bled freely, and were swollen and scorbutic looking. The patient was apathetic and could only be induced to take nourishment or do anything at all with the greatest difficulty. Half-grain doses of calcium sulphide were given in pill form, the mouth was treated with tannic acid in glycerine following mild antiseptic washes, and local measures were continued for the skin lesions. These measures proved effective only to a partial extent, and in the course of the following week several large carbuncles formed, and any irritation of the skin appeared to have a tendency to produce this condition.

The patient was twice seen by Doctors Montgomery and O'Brien in consultation with me, who agreed that nothing more could be done. Fresh bone marrow was obtained daily from the market, and every form of concentrated nourishment tried in turn, but after two or three administrations the patient invariably turned against it and something else had to be found.

By the 12th September the carbuncles had greatly improved. Nearly all the sloughs had separated and the residual ulcers were granulating well. The patient, too, seemed a little less apathetic.

Small prophylactic doses of quinine (five grains) had been given on the 8th, 9th, and 10th, but on the 16th the temperature, which had begun to fall after the improvement in the carbuncles, rose again to 99·6°, and examination of the blood showed that malaria parasites were again present. Very great difficulty was experienced in inducing the patient to take quinine, and that given by the mouth was quickly vomited. It was then given in repeated high rectal injections, some of which were retained for an appreciable time.

On the 17th the patient was again seen at my request by Doctors Montgomery and O'Brien and the question of administering intra-muscular injections of quinine was considered. It was decided, however, that in view of the great likelihood—with the tendency to forming carbuncles—that this might result in the formation of another deep seated and large slough, which the patient was not in a condition to withstand, it would be better to watch the effect of the quinine that had been administered per rectum—and which had as yet hardly had time to manifest its action—before resorting to this last measure. On the 18th the temperature was still rising, and although only 99·8°, the patient, in his weak state, was partially delirious, while the parasites were more numerous in the blood. After further consultation, therefore, ten grains of quinine was injected intramuscularly, but the patient never regained consciousness and his temperature continued to rise until it reached 101·8° at 9.15 p.m., when he died.

In this case the actual blackwater fever soon cleared up, but left badly damaged kidneys. The condition then was first an acute, and subsequently a sub-acute, nephritis; the urine always being albuminous to the end. The carbuncles were in part the secondary result of the continued excretion of irritant products of metabolism by the skin, which, in the patient's weak condition, it could not withstand. This further weakened him until a condition of such exhaustion was produced that a very small malarial infection was sufficient to cause death.

W. W. CLARIDGE,
Medical Officer.

CASE 10.

REPORT ON A CASE OF BLACKWATER FEVER AT SEKONDI.

European (official), age —.

I. *Locality*.—

Residence since January, 1913: Various places in the south of Ashanti and the west of the Colony. The accommodation in these places seems to consist of rough rest-houses surrounded by thick bush, numbers of natives being close at hand; flies and other vermin numerous, and the under parts of the houses generally occupied with native produce.

During the last three months there have been heavy rains.

I cannot get reliable details as to mosquitoes, biting fleas, ticks, bugs, lice, and fleas.

II. *Seasonal variation*.—

Heavy rains.

III. *Personal history*.—

(a) Two tours in Northern Nigeria, and two tours on Gold Coast, rough pioneer work.

He admits to very little previous illness.

Records for this tour.—At Tarquah, 31st March, 1913, to 6th April, 1913, siriasis.

At Tarquah, 29th April, 1913, to 3rd May, 1913, sciatica and malaria.

Seccondee, final illness, admitted 12th August, 1913, and died 19th August, 1913, admitted with quartan malaria, developing on fourth day into hæmoglobinuria.

He professed to be a regular quinine taker.

History of chronic C_2H_5 (OH).

(b) See Section I.

(c) Blood examined shortly after onset of hæmoglobinuria.

						Per cent.
Polymorphonuclears	...	...	...	...	...	83
Lymphocytes	...	...	...	...	...	11
Large mononuclears	...	...	...	...	...	6
Eosinophiles	...	...	...	...	...	0

No pigmented leucocytes.

No nucleated red corpuscles.

No parasites.

DETAILED REPORT.

The patient came out first to West Africa in 1908 to Northern Nigeria. No fever (?). Second tour was to Gold Coast, again no illness (?). Likewise third tour. The present is the twelfth month of his fourth tour. His sick record is not good, and is as follows:—

Tarquah.—Illness, siriasis, 31st March, 1913, to 6th April, 1913; advised as to clothing and abstinence from alcohol.

Tarquah.—Illness, sciatica and malaria, 29th April, 1913, to 3rd May, 1913; on second day of illness given quinine grains X. per rectum. This set up an unstable condition of rectum and diarrhoea. Advised to take quinine, grains X., and after that grains V. regularly.

Since May he has been crippled with rheumatism and sciatica. This, he says, followed a trolley journey he made from Prestea to Tarquah during a tornado, the result being that he got wet through. (Journey, 19 miles.)

C_2H_5 (OH) for some months past.

Previous to this admission to hospital I have been treating him for some weeks for rheumatism. He was an unsatisfactory patient, and appeared to wish to avoid medical attendance. He professed to be a regular quinine taker.

For the present illness he was admitted to hospital on 12th August, 1913, against his inclination. He said he had been ill for about a week previously. I found him in the Railway Institute about 5 p.m. with a temperature of $103^{\circ}4$. His blood was

taken on admission to hospital, and found to have a scanty infection of quartan malaria. On the evening of admission he was given quinine, grains VI., intramuscularly. Next morning his temperature was subnormal. A routine treatment of quinine was continued, and his temperature remained normal or subnormal till the evening of August 15th, nearly three days. He professed to feel better, but had no desire to get up, or to have more food. Liver and spleen were slightly enlarged; about 4 p.m. on 15th August, 1913, he began to feel distressed, disinclined for food; he had frequent shiverings, and inclination to vomit; temperature rose steadily to $101^{\circ}8'$, at 10 p.m., $103^{\circ}8'$, and at 10.30, $104^{\circ}8'$. I was inclined to think it was fresh crop of malaria parasites. He was given 10 grains aspirin, and I was just preparing to give him a wet pack when at 10.45 he passed an ounce of very black urine. His blood was taken immediately after. No parasites were found. Leucocyte count as follows:—

	Per cent.
Polymorphonuclears	83
Lymphocytes	11
Large mononuclears	6
Eosinophils	0

No pigmented leucocytes nor nucleated red corpuscles.

Treatment adopted was saline injections every three hours. Soda bicarb., grains V., liq. hydrag. perchlor., m XV., aquæ ad 1 oz., every two hours. Ice to suck. Barley water to drink. At his own express desire he was occasionally given a little ginger ale. For the vomiting he was also given an effervescent mixture every three hours; vomiting was troublesome for the first 48 hours. In addition to the effervescent mixture the side of his neck was blistered. Turpentine stupes were placed over his kidneys to accelerate the secretion of urine, with success. On the two occasions 10 c.c. of normal saline were injected into his abdominal wall.

Jaundice and anæmia became very extreme. Urine contained methæmoglobin, but distinctly and steadily improved. The quantity passed was deficient, and the rate of secretion intermitted.

On the evening of 18th August, 1913, he became restless. The temperature had come steadily down and was now subnormal. Pulse had remained about 112.

As he had only passed $1\frac{3}{4}$ oz. of urine since 2.20 a.m. turpentine stupes were repeated, with beneficent effects as regards urine; 18 ozs. of urine were passed during the night. In the morning there was a change for the worse. He had slept fitfully, and was inclined to be delirious. It is possible he was affected by natives firing off guns practically all night. I had appealed unavailingly to have this stopped. He was given champagne to sip, but was averse to it. About 10.30 a.m. symptoms of syncope threatened. His pulse became weaker and he was clammy cold. He was given hypodermics of brandy, and of strychnine and digitalis, and then a rectal injection of brandy and water. The other usual remedies were tried. The syncopal symptoms started after an attempt at defæcation.

Death occurred at 1.20 p.m.

E. W. GRAHAM,
Senior Medical Officer.

CASE 11.

HISTORY OF A BLACKWATER FEVER CASE ADMITTED TO THE COLONIAL HOSPITAL, ACCRA, ON THE 27TH AUGUST, 1913. AT 8 A.M.

European (non-official).

I. *Locality*.—

(a) Weshiang, Accra Waterworks, river and low-lying ground flooded for the last two months.

Bush sparse.

(b) No other case in the district.

(c) Mosquitoes and other biting insects numerous.

Anopheles.

Stegomyia.

Culex.

Tabanidæ.

Muscidæ.

II. Seasonal variations.—

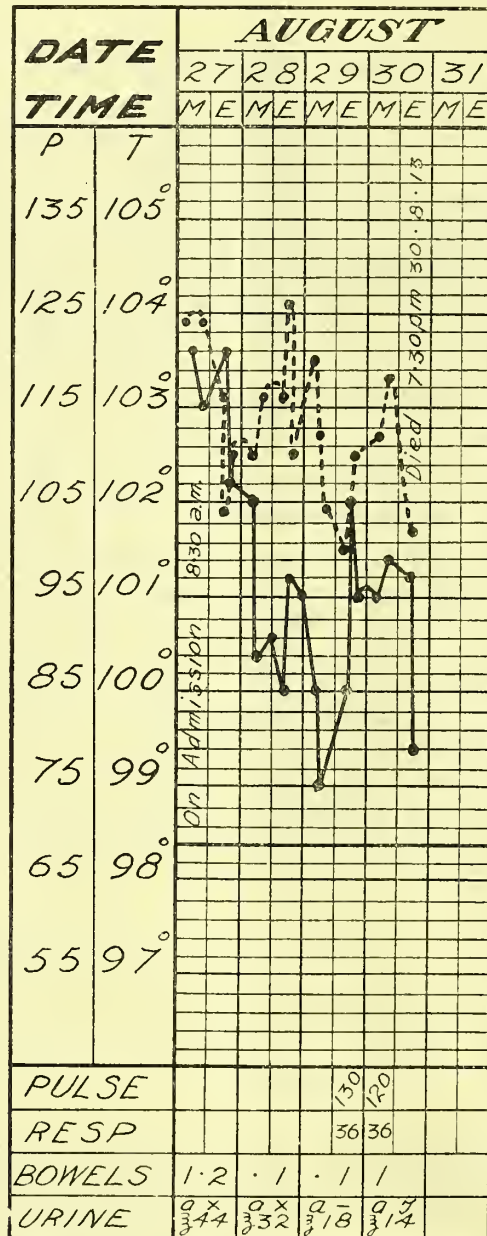
Usual climatic conditions for the time of year—dull, temperature running between 76° to 80°.

Moderate rains, about two inches in August.

III. Personal history.—

(a) Little known. Had about a dozen slight attacks of fever during the last few weeks; was in the habit of taking 5 grs. quinine every second or third day.

(b) Had been working at the waterworks for six weeks; previous movements unknown. Sleeping in native huts; food deficient in quantity and quality.



(c) Blood smear negative for malaria parasites; hæmoglobin 12 per cent. for some hours before death, and blood count 800,000. The patient was sent in from Weshiang waterworks; he had been in this country since July last year, but only during the last six weeks resident at the waterworks; he was first seen by Dr. Brabazon late the afternoon the day before (26th) when he found him passing dark-coloured urine; temperature (6 p.m.) 102°, and at 10 p.m. 105°. The man had no previous tropical experience; he had over a dozen attacks of "fever," but no ague;

had been in the habit of taking quinine every second or third day, 5 grains or more, when he felt out of sorts. He felt rather ill on Sunday, 24th instant, and on Monday morning took three tabloids of quinine (presumably 5 grains each), and had rigor and passing of black urine after midday. Condition on admission to hospital—temperature $103\cdot6^{\circ}$, pulse small and weak, 120; whole body very yellow; no pain; shortly after arrival passed 4 ounces of urine about colour of burgundy; albumen in abundance; blood smear negative for malaria.

Treatment.—Sternberg's mixture, saline rectal enemas two pints per diem in three doses; 6 p.m., pulse a little better; temperature $103\cdot6^{\circ}$; vomited about five ounces green fluid; bowels have acted several times loosely, and containing much mucus.

28th August, 1913.—A quiet night; passed a fair quantity of urine, but almost as dark as before; vomited three times creamy green fluid; complains of excessive thirst; tongue coated and dry; temperature $100\cdot6^{\circ}$, pulse 108, weak; respirations 22, and inclined to be periodic; hæmoglobin 25 per cent.; icterus very deep.

4 p.m.—Very weak at times; restless; rejects rectal salines; pulse rather weaker and small. Two pints normal saline intramuscularly; 32 ounces of urine passed during the last twenty-four hours, lighter in colour.

29th August, 1913.—Rather restless; low muttering towards 4 a.m.; condition grave, but improved after saline and champagne.

9 a.m.—Very weak; pulse 112, small and soft; temperature 99° ; complains of severe pain over the whole abdomen, which pain he has had since Monday; urine quite clear, and containing only a little albumen, but none passed since 5 a.m.

6 p.m.—Still very weak; pulse 125, respirations 36; icterus passing off; urine becoming much clearer, dark sherry colour; retaining all nourishment by mouth, also the rectal saline injections, which he is having every six hours (8 ozs.); rests quietly, and sleeps a good deal; hæmoglobin 12 per cent. 10.30 p.m. Hypodermic injection of strychnine given; 18 ounces of urine passed in the last twenty-four hours.

30th August, 1913.—Rested very well during night, but very weak this morning; pulse 120, respirations 36; nine ounces of urine passed at midnight, and at 6 a.m. bed was found saturated with urine, and fæces also had been passed in bed. Hypodermic of strychnine given at 9 a.m.; urine quite a natural colour, very slight trace of albumen.

7.30 p.m.—Patient became rapidly weaker all day, and died at 7.30 p.m. At 4 p.m. he passed 8 ounces of clear urine, and blood taken at midday showed the count to have fallen to 800,000 c.c. Death was caused by extreme rapid anæmia, the acute blackwater symptoms having been overcome.

C. B. HUNTER,
Senior Medical Officer.

CASE 12.

REPORT ON A CASE OF BLACKWATER FEVER AT SEKONDI.

Native (official), *aet* 40.

I. *Locality.*—

(a) *Physical features.*—The patient lived in Accra Town, Sekondi. I have visited the house. There is no swamp, bush, or forest near it.

The area is not congested.

(b) There have been no other cases in the building or in that district.

(c) The insect fauna consist chiefly of a few anopheles and stegomyia mosquitoes. I found no biting flies, ticks, bugs, lice or fleas, &c.

II. *Seasonal variation.*—

About the end of the rainy season, which has not been abnormal. The weather recently has not been so hot as usual, and the nights have been cold.

III. *Personal History.*—

(a) Has not been known to suffer from any other serious disease, but has frequently had malaria, the last attack being last month, when he was placed on the sick list from August 1st to August 6th, 1913. He only took quinine when he had fever. He always slept under a mosquito net.

(b) A native of Cape Coast, but has been stationed at Sekondi for many years. He went on leave to Cape Coast at the beginning of the year, and returned to duty at Sekondi in March. He lived in a good house in a very clean part of the town. I believe he was temperate in his habits.

(c) Microscopical examination of the blood (by Dr. Hänschell) made on the fourth day of the disease directly after the patient reported sick.

With the exception of occasional attacks of malaria he has not been known suffering from any serious disease previously. He was on the sick list from August 1st to August 6th with benign tertian malaria.

He made a good recovery and returned to duty quite well.

Present history.—On the 8th September he felt ill with headache and shivering, and did not go to his office. That evening his urine became black in colour and scanty in amount.

He continued to be ill, and on the 11th September he reported to me in writing that he had fever and was too ill to come to hospital. I sent the hammock for him, and met him on his arrival at hospital at about 11.30 a.m.

His temperature was 99.8° F. Pulse 126 and very weak. Liver and spleen were both greatly enlarged; his conjunctivæ were deeply jaundiced. He passed a little dark-coloured urine after admission and again in the evening. The treatment adopted was a modification of Hearsey's.

The patient rapidly became weaker, and died at 10.40 p.m. on the same day.

It was unfortunate that the deceased did not report his illness until the fourth day of his disease.

A post-mortem examination was made on the morning of the 12th September. I attach the post-mortem report.

I am indebted to Dr. Hänschell for the following report upon the patient's blood and urine.

Blood.—

Differential count (300 counted):—

	Per cent.
Polymorphonuclears	77
Lymphocytes	10
Mononuclears	13
Eosinophiles	Nil.

Very scanty subtertian rings were found.

Total red blood corpuscles, 600,000.

Total white blood corpuscles, 22,500.

No pigmented leucocytes were seen, but six nucleated red corpuscles

A thick blood film showed *Filaria bancrofti*.

Urine.—Specific gravity, 1.017.

Albumen present.

Slight trace of bile.

Alkaline methæmoglobin (revealed by spectroscopic examination).

Hæmoglobin index, 25 per cent.

The small number of red blood corpuscles made life practically impossible.

POST-MORTEM REMARKS UPON CASE 12.

Thorax.—The heart was normal in size and revealed no traces of organic disease except a little commencing atheroma of the first part of the thoracic aorta. There was very little fluid in the pericardium, a little blood in the left side of the heart, and practically none in the right side. The blood present was extremely thin and watery in all the vessels. Both lungs showed old pleuritic adhesions; this was more marked on the right side than the left.

Abdomen.—The liver was very much enlarged, and was very adherent to the diaphragm, ribs, and spleen; there was commencing cirrhosis on the anterior surface of the left lobe.

Some small fibroid new growths were seen distributed throughout the liver, some appeared on the surface, but caused no puckering or umbilication of the surrounding hepatic tissue. In colour they were whitish-yellow. The gall bladder was normal. The spleen was enlarged and adherent to the liver; it was of a pale plum colour. The kidneys were normal, and the capsules stripped easily. The bladder contained a little urine. The stomach and intestines displayed no abnormalities. Everywhere the anæmia and small amount of fluid were markedly pronounced. The parent forms of the *Filaria bancrofti* were searched for, but not found.

H. W. GUSH,
Medical Officer.

CASE 13.

REPORT ON A CASE OF BLACKWATER FEVER AT COOMASSIE.

European (official), age 32.

I. *Locality.*—

(a) *Physical features.*—Coomassie is about 800 feet above sea-level. Built in a series of small huts, divided from each other by swamps. The swamps surrounding the locality occupied by the non-commissioned officers of the Gold Coast Regiment, and most of the civil population, have been well drained. Bush has been cleared for 600 yards in the vicinity of the patient's residence outside this area in dense forest. Climate at this time of the year is very damp, as much rain has been falling for the last two months, *i.e.*, August and September.

(b) *Case series.*—I can find no record of a series of cases in any one building except in the Bank of British West Africa. This is a comparatively new building, well built as lately as 1907. There was a case here in June, 1912, and another in April, 1913. This building is nearer the native town than that of the patient's.

A non-commissioned officer of the Gold Coast Regiment died in the same room as the patient was living in, in 1904, but the cause of death was not blackwater fever.

(c) *Intercourse with natives.*—As regards intercourse with natives, the patient had, I should think, only the same amount of intercourse with natives that other Europeans have. He was brought into contact with them during his work.

(d) *Insect fauna.*—The patient's quarters have been carefully searched by the Medical Officer of Health (Dr. O'Brien) and myself, and no insect fauna which could possibly communicate blackwater fever were found. There were no mosquitoes or biting flies or bugs, &c., to be found.

The Medical Officer of Health informs me that *Anopheles costalis* is the most common mosquito here.

Previous and personal history.—Previous illness: nothing worthy of mention.

Patient is aged 32, unmarried. Has been 14 years in the Army. Has not been in India or Egypt.

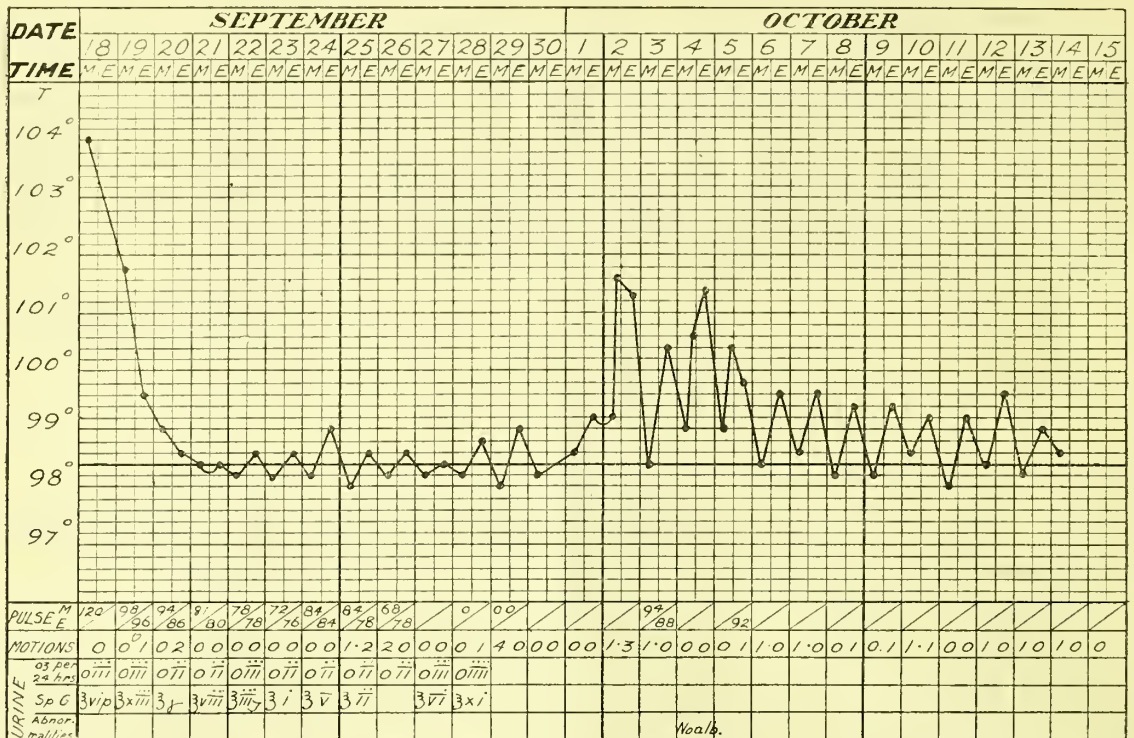
He was in South Africa one year in 1902, in East Africa, 1907-1909, and, although he admits having had a little fever there, has never been on the sick list. It is noteworthy, perhaps, that he was only 2½ months in England before coming here. He has almost completed his third period of twelve months in West Africa: he has been in Kintampo for (two) periods of five months each, and in Zouaragu for nine months of this his third tour.

Attacks of malaria.—None till his second tour, when he states that he had an attack of fever which has lasted a month, and necessitated his transfer to Coomassie. He was quite well during this tour till his return from Zouaragu, in the Northern Territories, in the August of this year (1913), and was seized with his attack of blackwater fever on the 18th September, 1913, about one month after his arrival.

Quinine taking.—He says that he has taken 10 grains euquinine almost regularly twice a week since he has been in West Africa.

Personal history.—Temperate and sober. As a rule in bed early every night.

Has been out in the sun a good deal. Has always been careful as regards his mosquito net, but says that he can remember getting mosquitoes in his net on occasions before this illness. Takes his meals regularly.



History of illness.—Dr. Montgomery, Provincial Medical Officer, reports as follows:—

At 6 p.m. on the 10th September I was called to see patient as he was not feeling well. When I saw him he had passed about two pints of porter-coloured urine. His temperature was 104°, and he was admitted into hospital at 8 a.m. For about ten days before he went sick he was feeling unwell, and had no appetite. On the 18th after lunch he lay down, and at 3 p.m. he had a rigor, and after an hour he passed black water. He had taken 10 grains euquinine that morning before breakfast. He had not taken any euquinine, with the exception of the above-mentioned dose, for the ten days before his illness.

Blood count:—

	Per cent.
Polymorphonuclears	50.9
Mononuclears	44.15
Transitionals	2.88
Eosinophils	1.19

19th September.—Patient had a restless night, he passed over a pint of porter-coloured urine during the night. Temperature coming down, and there was only a slight inclination to vomit.

21st.—Urine nearly clear-coloured, but albumen still present. Was put on Easton's syrup twice daily, and the modified Sternberg treatment stopped. His rectal injections of normal saline, each containing a pint, of which he was getting three a day, were discontinued.

23rd.—Albumen disappeared from urine.

24th.—Observed a slight rise of temperature at night, and he was given three grains quinine in solution, and an enema and purgative next morning.

25th.—His jaundice, which was only slight and apparent since 20th, has passed away. No parasites were found in his blood.

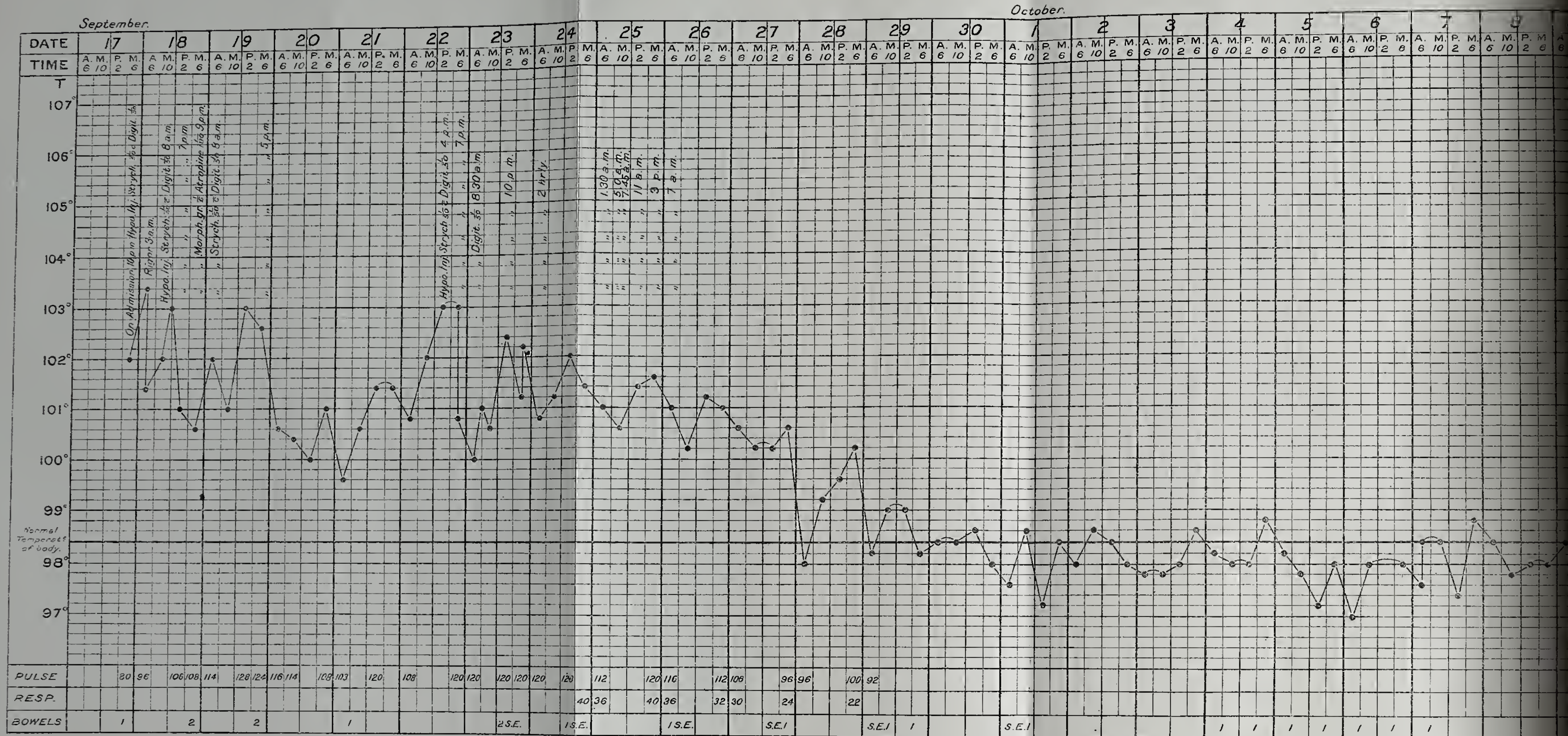
26th.—Patient going on well, and put on increased diet.

29th.—Patient still weak and bloodless, and has not got out of bed yet.

October 1st.—Case taken over by me, and a note made that patient was going on well.

2nd.—Slight rise of temperature at night, and on 3rd temperature at night rose to 101.6° after slight rigor. Pulse 88-94. Tongue clean, felt no discomfort. Urine continued free from albumen, and it was acid in reaction.

CASE 14.



4th.—Morning temperature 98·6. Blood : no parasites. Spleen much enlarged, and liver slightly so. Bowels very constipated. Easton's syrup stopped, and 20 grains quinine ordered in divided doses, with zi. mag. sulph., and 10 grains salol. pil : hydrarg : grains V, at night. Diet reduced.

5th.—For temperature see chart. Still obstinate constipation. Urine : no albumin. Blood : no parasites.

6th.—Temperature still elevated at night. Several very foul stools after morning enema.

9th.—Still an evening rise of temperature, which continued till 14th. Patient otherwise comfortable.

14th.—Invaliding Board held.

17th.—Proceeded Sekondi. Invalided to England.

F. S. HARPER,

Acting Provincial Medical Officer.

CASE 14.

REPORT ON A CASE OF BLACKWATER FEVER AT SEKONDI.

European (non-official), age 27.

I. *Locality*.—Sekondi.

(a) *Physical features*.—Fairly up-to-date drainage and sanitation. No bush and no swamp in the neighbourhood.

(b) No cases on record.

(c) Mosquitoes not numerous; anopheles, culices, stegomyiæ, glossinæ, rare; ticks, bugs, lice, fleas, &c., absent; residence formerly at an hotel. Cases of malaria are frequent.

II. *Seasonal variation*.—

End of rainy season. Not much rain, but ground has lately been rather saturated.

III. *Persoual History*.—

(a) Patient came to the Gold Coast five years ago. This is the sixth month of his fourth trip.

He states he has had no malaria since 1910, and that he has been in the habit of taking 20 to 25 grains of quinine weekly.

(b) Has been in Sekondi all this tour with exception of ten days' visit to Cape Coast Castle six weeks ago.

(c) Blood examination within few hours of onset of hæmoglobinuria.

	Per cent.
Polymorphonuclears	69
Lymphocytes	11
Large mononuclears	20

Quartan and tertian parasites. Subtertian scanty. One pigmented leucocyte. Total, 4,000,000.

Leucocytes, 16,500.

Hæmoglobin index, 80 per cent.

Present illness.—He was admitted at 10 p.m. on 17th September, 1913. Slightly jaundiced and temperature 102°. Spleen and liver not enlarged. He had a rigor during his first night. He was treated with saline injections, liquid by the mouth, hypodermics of digitalin and strychnine. Bowels were emptied as required by enema.

Progress was at first satisfactory. Urine cleared on fourth day.

On 23rd September, 1913, he was still extremely anæmic.

Hæmoglobin index only 10 per cent.

Condition on 24th September, 1913, was very alarming. Respirations rose to 48 per minute, pulse 120 and thready, and he was delirious.

Nutrient enemata were given, brandy by the mouth, in addition to saline injections, hypodermics of digitalis were given three hourly. His condition slowly improved, but remained very serious for two days more. He was discharged from hospital on 9th October, 1913, still very anæmic. He left for home a few days later.

E. W. GRAHAM,

Senior Medical Officer.

CASE 15.

REPORT ON A CASE OF BLACKWATER FEVER AT CAPE COAST.

Syrian (trader), age 30. Female.

I. *Locality.*—

(a) One of the best positions in the mercantile part of the town. Cement drains round the house; no bush near. Roomy house, situated at a corner.

(b) No other cases have occurred in or near the present one. Native dwellings near at hand, and constant intercourse with natives owing to business relations. Lives with her husband and two small children. The latter have frequent attacks of fever.

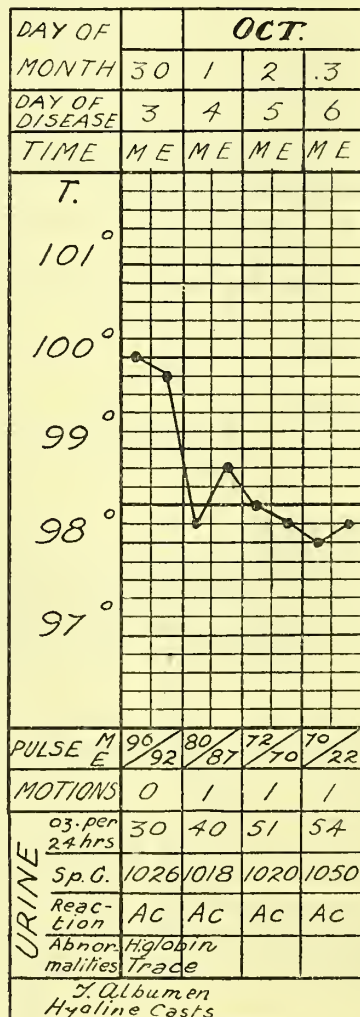
(c) Personal habits of this family very clean—no lice, &c., observed. Mosquitoes rarely in evidence.

II. *Seasonal variation.*—

Close of an exceptionally wet season. Not heavy rains, but light showers of almost daily occurrence. Unusually cool.

III. *Personal history.*—

(a) Resident on the Gold Coast for the past five years. Small attacks of fever about every four months, for which she took liquid quinine obtained from a native qualified practitioner (dosage unknown). No history of any specific disease or previous kidney trouble. Total abstainer. Apart from the recurring attacks of fever above mentioned, she felt quite well until the evening of the 28th September, when she suddenly had a rigor, followed by strong fever. Took some liquid quinine (dose unknown) and sweated profusely. Urine said to be as usual—ordinary colour.



Fever continued throughout the 29th, and it was not until the morning of the 30th that she noticed her urine was bright red, and sent for medical aid. Bowels had been regular, and the motions normal in appearance.

She said she had vomited twice some thin, yellowish fluid.

(b) Has not been out of Cape Coast for the past five years. Subject to hard conditions, as she has entire charge of her two children, in addition to long hours working in her husband's store.

(c) Blood examinations: No parasites found. Polymorphonuclears, 20 per cent. This was the condition on the third day of the disease, and remained so during the following three days.

IV. *Clinical history.*

First attack of blackwater fever.

1st day.—Skin moist, no jaundice. Tongue moderately furred all over. Nausea, but no vomiting. Pain in loins and back. Spleen considerably enlarged, reaching two inches below the costal margin. Liver, normal. General condition highly neurotic.

Urine: Claret-coloured. S. G. 1026. Trace of albumen. No blood corpuscles, but hyaline casts present. Hæmoglobin present. In twenty-four hours, 30 ounces.

2nd day.—Slight jaundice and anæmia. No pain in loins or back. Headache. No vomiting; motions normal. Urine clear, but bile tinged. No albumen or hæmoglobin. In twenty-four hours, 40 ounces. General condition much improved.

3rd day.—Everything normal. Feels well, but weak.

4th day.—Improvement maintained. Iron and strychnine tonic, to be followed by regular doses of quinine later. No further visits paid.

Remarks. A slight attack, lasting altogether, as regards the hæmoglobinuria, only two days. I enquired on the 13th October, and heard that she continued quite well, no relapse having occurred.

T. H. DUGON,
Medical Officer.

CASE 16.

REPORT ON A CASE OF BLACKWATER FEVER AT ACCRA.

European (official), age 34.

I. *Locality.*

(a) Flat grassy land—no bush. No native dwellings near.

(b) No other case in the district.

(c) Mosquitoes, few.

Anopheles.

Culex.

II. *Seasonal variations.*—

Usual climatic conditions for the time of the year, occasional shower. No rain in the month of September. Temperature running between 79° and 84°.

III. *Personal history.*—

(a) Was in the habit of taking 5 grains of quinine daily, and wearing mosquito boots in the evenings.

Had frequent attacks of fever during the last three or four months for a day or two at a time, but continuing at his work.

(b) His work obliged him to be making short trips to the bush behind Accra during the last few months for a few days at a time.

(c) Blood smears on admission to hospital showed subtertian malaria parasites in large quantity. Hæmoglobin for some hours before death was down to 10 per cent.

The patient was first seen at the consulting room of the hospital on the morning of the 8th of October, 1913, complaining of having had fever all night and aching all over. On taking his temperature it was found to be 103.4° , and he was admitted to hospital at once.

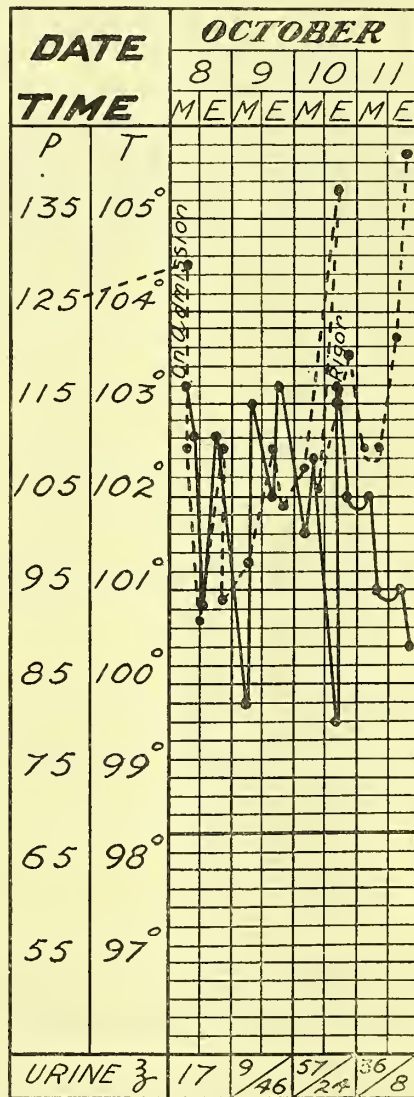
Blood examination showed numerous subtertian parasites. Spleen slightly enlarged.

He was given diaphoretics and quinine, and his temperature came down to 100.8° during the day.

At 6.30 p.m. he had a slight rigor, and at 10.30 p.m. the urine he passed was noticed to be very black. He rested fairly well all night, and passed 8 ounces of black urine again at 6.30 in the morning, and at 8 o'clock there was a little vomiting of clear fluid.

During the ensuing twenty-four hours he passed sixty-five ounces of very black urine.

Treatment consisted of being kept at perfect rest, barley water, Brand's and Valentine's juices, fresh chicken soup, Perrier water, and saline injections every four hours, and fomentations to loins, and elevation of lower end of bed, and occasional hypodermic injections of morphia ($\frac{1}{4}$ grain).



Previous history.—This is the patient's ninth month of his second tour on the Coast. From the records it is seen that he had been on the sick list on two occasions, during his first tour suffering from malarial fever.

He began the present tour in the Gambia Colony, and spent two months there, where he had ptomaine poisoning.

He then came to Cape Coast, where he was ill for nearly a month with sciatica. In June last he was working on the side of the Volta, where he says he got badly bitten by mosquitoes.

For the last three months his headquarters have been in Accra, but during that time he has been going up country, two days' march off, to different places and stopping away for two or three days at a time.

For the last two months he had been having attacks of fever for a day or two at a time about every two weeks, but never going on the sick list, and keeping at his work.

The present attack began really on the evening of the 4th instant, when he had a shivering fit followed by fever, and he thinks the fever has been constant since, although he kept going about at his work.

He says he has been a regular taker of quinine, 5 grains daily, and wore mosquito boots in the evenings.

3. During the 10th instant large quantities of black urine continued to be passed, over 80 ounces in the twenty-four hours, and at 12.30 p.m. that day he had a rigor lasting half an hour, and later on some vomiting of clear fluid, but on the whole he retained his nourishment very well, also the saline injections. On the 11th conditions remained much the same, the urine was lighter in colour, but still black, but there was more vomiting of yellow and green coloured matter. He became very blanched in appearance, and for a few hours before death was almost unconscious.

During the day the blood smear showed only about 10 per cent. of hæmoglobin, and he died at 9.30 in the evening, death being due to hæmorrhage.

C. B. HUNTER, Senior Medical Officer,
Colonial Hospital, Accra.

CASE 17.

REPORT ON A CASE OF BLACKWATER FEVER AT ACCRA.

European (non-official), age 36.

I. *Locality*.—

(a) Weshiang; waterworks; river and low-lying ground; flooded for the last three months; bush sparse.

(b) Last case in the same locality occurred six weeks before this one.

(c) Mosquitoes and other biting insects numerous—

Anopheles.
Stegomyia.
Culex.
Tabanidæ.
Muscidæ.

II. *Seasonal variations*.—

Usual climatic conditions for the time of the year, dull with frequent showers. Temperature running between 75° and 80°.

III *Personal history*.—

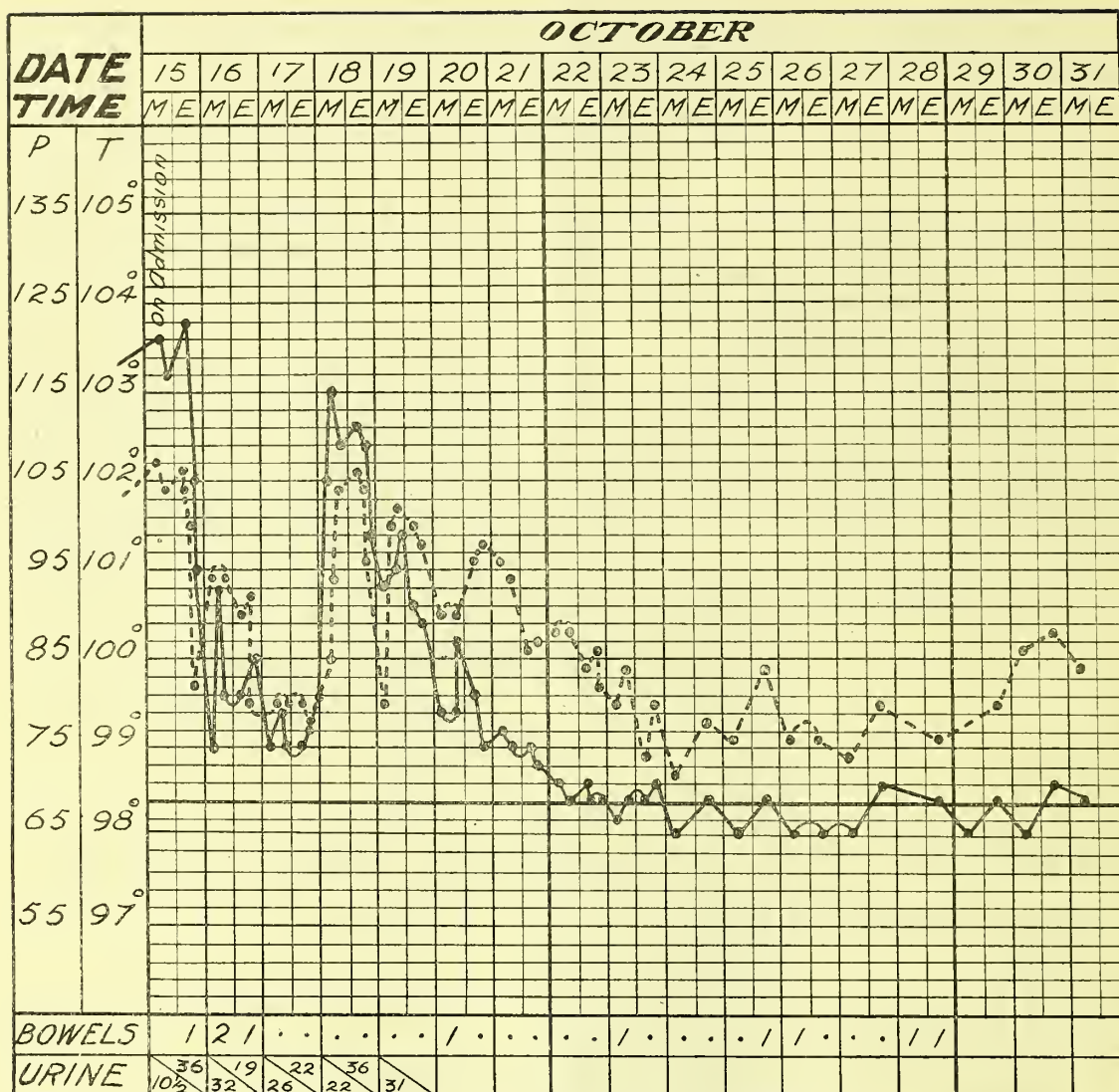
(a) Been on the West Coast since January last; during last four months had fever about every three weeks for two or three days at a time. Was in the habit of taking 5 grs. quinine daily. Sleeping in native-built huts under mosquito net.

(b) Blood smears negative for malaria parasites.

The previous two years he had spent in Egypt, when he had good health; since coming to the Coast he has been working at the waterworks, Weshiang, all the time. During the last four months he has been having attacks of fever about every three weeks for two or three days at a time; says he has been taking 5 grs. of quinine daily since coming to the Coast; sleeping under mosquito net, wearing mosquito boots in the evenings.

This attack of illness began on the morning of the 14th instant, the day before admission to hospital, where he had a severe headache with a temperature of 99°; by 5 p.m. the temperature was 102°, and he passed dark-coloured urine accompanied by a little vomiting. Had a very restless night, passing a good quantity of urine, containing a large amount of hæmoglobin; when brought into hospital there was a jaundiced appearance all over the body; temperature 103·6°, pulse 105. He passed 8 ozs. of urine soon after coming in; it was not the intense black colour often seen.

Blood examination did not show any malaria parasites.



Treatment.—Saline rectal injections 8 ozs. every four hours; a mixture of potas. acet. milk, barley water, Perrier water, and perfect rest.

About 10 p.m. the same day the urine began to get a lighter colour, also that passed at midnight.

16th.—At 2 p.m. he had a rigor, and the next urine passed was darker coloured again, which continued much the same until the evening, when it showed signs of clearing. He had been taking his nourishment well and retaining the saline injections; had only been sick once, vomiting a little yellow-coloured fluid, about 6 ozs. In the first twenty-four hours of being in hospital he passed 64 ounces of urine.

17th.—Had a good night, getting a fair amount of sleep. This morning, urine cleared up, a dark sherry colour. Temperature 99·4°, pulse 74.

18th.—About midnight the urine again became dark coloured, and the temperature went up to 103°, and he vomited 8 ozs. of green-coloured fluid; there had been no rigor.

18th.—During the afternoon the urine began to clear up again, and by the following morning (19th) it was light sherry coloured.

Taking his nourishment of milk, barley water, and Benger's food well, and getting a fair amount of sleep.

20th.—Jaundice passing off, had a good night, and feeling much better, but he is anæmic; hæmoglobin 40 per cent.

22nd.—Patient going on satisfactorily, urine normal, sleeping well, begins to take a little solid food.

31st.—Patient made good progress, walking about for the last five days, and left for Europe.

C. B. HUNTER,
Senior Medical Officer.

CASE 18.

REPORT ON A CASE OF BLACKWATER FEVER AT CAPE COAST.

European, age 33 years.

I. *Locality.*—

(a) The bungalow is situated on a hill outside the town. The surroundings of the house are kept free from bush, and the drainage is excellent.

The office is situated in the midst of the native community, but the patient invariably left it by 5 p.m.

(b) This is the second attack of hæmoglobinuria that the patient has had in the same house within the last five months. (*Vide Case 5. ante.*)

(c) Personal habits very clean, but seldom, if ever, took quinine between his different attacks of fever. He often had small attacks of fever without calling for medical advice.

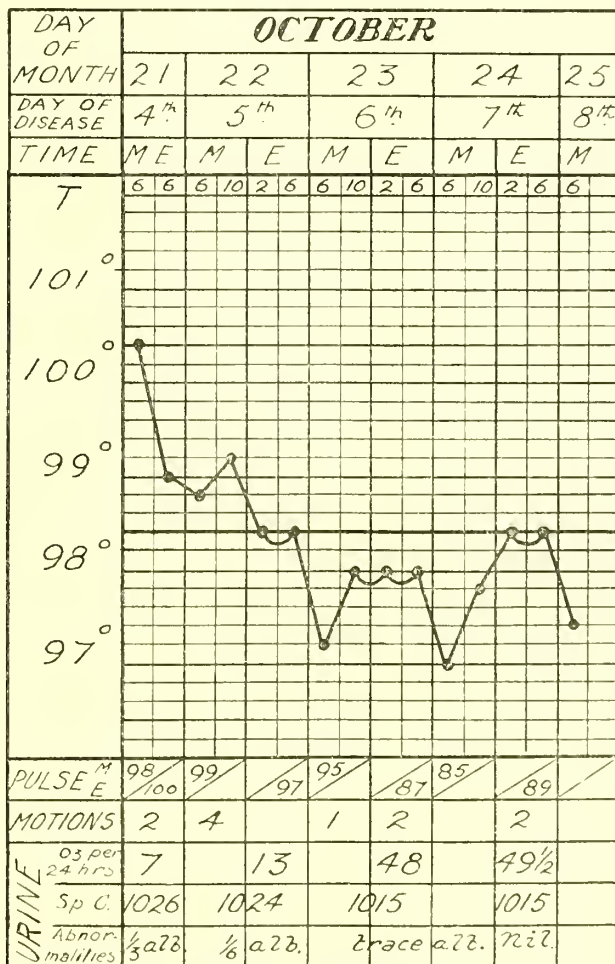
Owing to the good position of his house it is practically free from mosquitoes. I was unable to find any biting flies in the vicinity.

II. *Seasonal variation.*—

Close of an exceptionally wet season. Moderately hot.

III. *Personal history.*—

(a) Resident on the West Coast for the past twelve years. In 1909 he was invalided to England with remittent malaria, and during the voyage home had blackwater fever for the first time. In 1911 he was invalided home with anæmia, the result of malaria and hepatitis, having contracted lues in 1910. In May of the present year he had his second attack of blackwater fever, and at the beginning of this month (October) a sharp attack of hepatitis, with mild malaria, from which he had completely recovered by the 17th October.



On the morning of the 21st October he sent for me because he had passed some "blackwater." I saw him at 6 a.m. His temperature was then 100.4°, skin moist,

tongue furred, and brown all over except at the tip, scleræ and skin jaundiced, had vomited about six times during the night, and the bowels had acted three or four times. Both vomit and motions were full of bile—no blood. The liver could be felt three inches below the costal margin; the spleen was not enlarged.

No tenderness over the abdomen, no pain.

Headache slight, pulse full rate. 98.

Urine.—Quite black (like stout), and very thick, faintly acid. S. G. 1026, albumen, one-third. Hæmoglobin. hyaline and tubular casts, and a few red corpuscles were present.

Blood.—No parasites. Marked leucopenia. He stated that he had felt "seedy" a day or two previous, but had had no rigor.

(b) *Previous movements*.—Was always stationed in Cape Coast, from which he occasionally paid visits to other small towns within a short distance of Cape Coast. He never had occasion to spend the night away from the station. Not subjected to hard conditions.

(c) *Blood examination*.—As stated above on the first day, and no change of importance occurred during the subsequent days of his illness.

Clinical history. 21st October, 1913.—At noon on the first day of his illness the temperature fell to 98·2°. Pulse 80.

Vomiting occurred three times between 6 a.m. and noon, and the bowels acted twice; large quantities of bile were evacuated on each occasion. No further urine had been passed in spite of the consumption of six large bottles of Perrier water. At 5 p.m. he was brought into hospital, and passed three ounces of black urine soon after, this making a total of seven ounces during the previous twenty-four hours.

During the same night (21st) bilious vomiting occurred three times, and the bowels acted four times.

He slept fairly well.

The *treatment* consisted of Sternberg's mixture every hour, hot sand bags to the back and loins, and Perrier water *ad lib*.

22nd October, 1913.—General condition better, but urine still black.

Vomited bile once. Total urine for twenty-four hours—13 ounces, containing one-sixth albumen.

23rd October, 1913.—Much improved. No fever during the day.

Vomited twice, but this resulted from an attempt to take Bovril.

Urine claret-coloured. S. G. 1015. Trace of albumen. Total in twenty-four hours—48 ounces.

Skin and conjunctivæ very yellow.

Marked anæmia.

Sternberg's mixture every two hours.

24th October, 1913.—No fever or vomiting. Urine clear and of normal colour; no albumen. Total in twenty-four hours—49½ ounces.

Sternberg's mixture every four hours.

25th October, 1913.—Passed 38 ounces of normal urine from 6 p.m. yesterday to 6 a.m. to-day. General condition fair, but very anæmic. Discharged to-day.

Remarks.—No quinine was administered throughout.

Leucopenia was a striking feature as in his previous attack of hæmoglobinuria, recorded by Dr. Hamilton.

A temperature chart is attached.

T. H. DUGON,
Medical Officer.

CASE 19.

REPORT ON A CASE OF BLACKWATER FEVER OCCURRING AT CAPE COAST.

European (non-official), age 45.

I. *Locality*.—

(a) House situated on sea-front, freely exposed to the prevailing breeze. No swamp or bush in the vicinity. Surroundings well drained.

(b) No history of other cases in this house or near at hand. Numerous native dwellings are situated at the back and west sides of the house, but there is a large open space on the east side. Intercourse with natives is frequent owing to trade relations.

(c) Biting flies, ticks, &c., are entirely absent.
Mosquitoes only seen occasionally.

II. Seasonal variation.—

(a) Marked dryness—no measurable quantity of rain having fallen for the past seven weeks. Strong harmattan has prevailed most of this time.

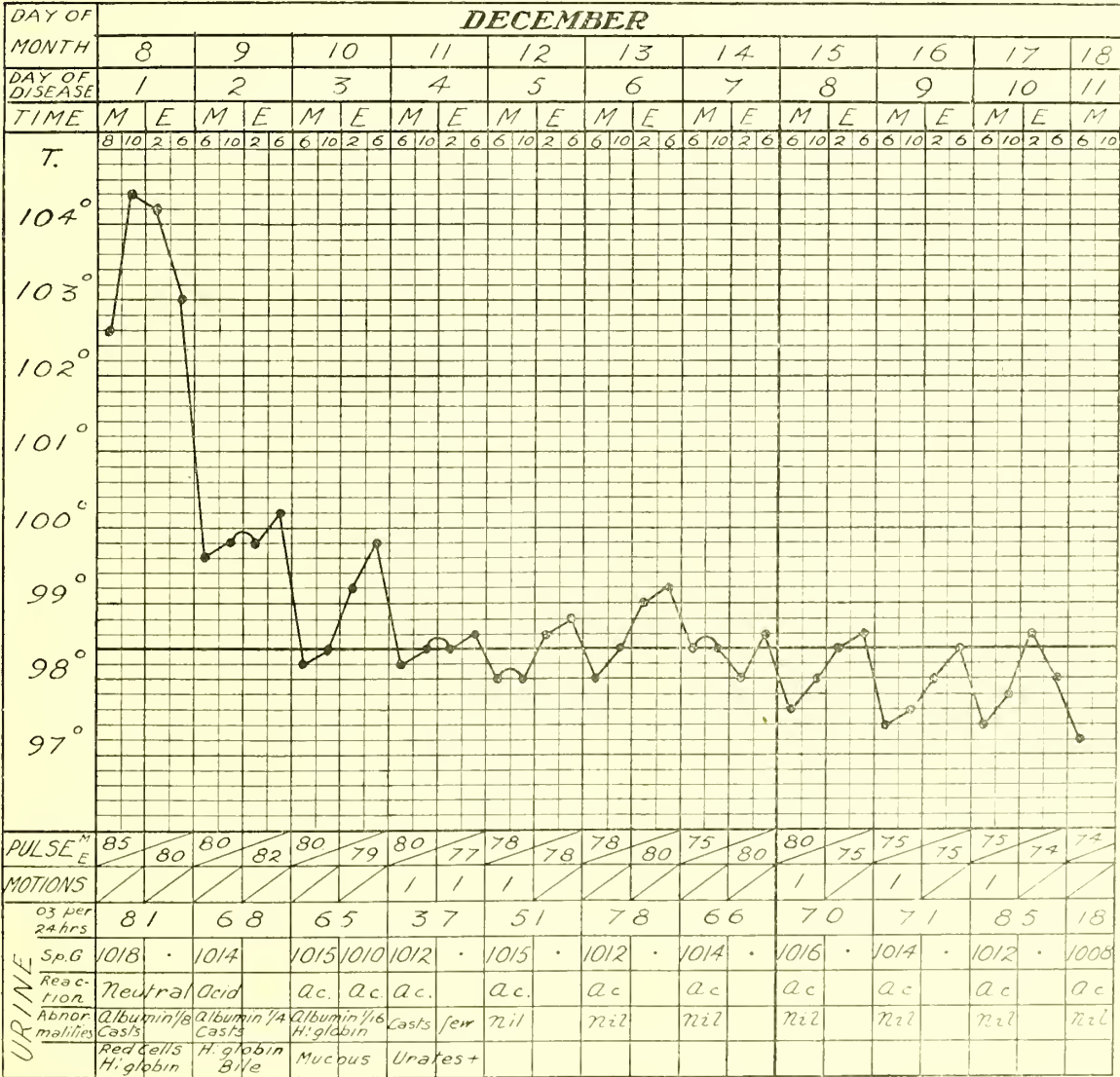
III. Personal history.—

(a) A man of exceptionally strong physique. He states that he has had no attacks of fever previously, or any other illness since childhood.

Quinine he took but rarely. States he took 5 grains on the 7th instant.

(b) First experience of the tropics; lived in London for the past 25 years. Has just completed twelve months on the Coast, eight of which have been spent in Cape Coast, and four at Dunkwa (20 miles up the Prahsu road). He has been living in Cape Coast for the past six months. His habits are strictly temperate, but he has greatly overworked himself, and confessed to recent family worries. He has stinted himself of good and general domestic comforts, although living with his two European assistants.

(c) Microscopic examination of the blood. See clinical report below.



IV. Clinical history.—

Felt quite well on the night of the 7th December. On the morning of the 8th he took "salts," which acted at 7 a.m. Then noticed that his urine was black. The stools were free, but he did not observe their colour. His assistants remarked at

once his yellowness, and sent him up to the hospital, where he arrived at 8 a.m. collapsed, shivering, and with a temperature of 102.6° . He immediately vomited a few ounces of light yellow fluid, probably the result of the salts he had taken.

He was given an ounce of brandy, put to bed between blankets, and forthwith began to sweat profusely.

He stated that he had felt "shivery" ever since rising that morning.

The skin was bright yellow, but the scleræ less so. He was drowsy, had slight frontal headache, but no pain.

The tongue was covered with grey fur, except at the lateral edges.

Slight tenderness over the liver, but no enlargement. The spleen could be felt extending two inches below the costal margin, but there was no tenderness.

A hæmic bruit was audible over the pulmonary area of the heart. The pulse full but soft.

Urine.—Stout-colour. S. G., 1018. Albumen, one-eighth. Large quantity of granular and hyaline casts. Many red corpuscles. Only a trace of bile, but much hæmoglobin.

Blood.—Subtertian ring parasites. Great increase in number of large mononuclears. Red corpuscles pale.

Treatment.—Liquid quinine, grs. V., four-hourly, until four doses had been taken—20 grs. per diem. He retained this well if given well diluted. In the ordinary strength of 5 grs. to the ounce he vomited it at once.

Milk diet, Perrier water *ad lib*.

During the midnight he sweated freely and slept fairly well. (The daily amount of urine passed can be seen on the chart.)

9th December, 1913.—Second day of disease. Urine porter-coloured. S. G. 1014, acid. Fewer casts. Blood showed no parasites. Stopped quinine. Gave Sternberg's mixture every hour. Vomited twice during the night as a result of purgative pills administered.

10th December, 1913.—Better this morning. Urine, dark amber colour, and contained much mucus. S. G. 1015. Very little hæmoglobin and no bile. Acid.

In the evening a relapse occurred. Urine again became the colour of porter, contained much hæmoglobin, S. G. 1010.

Parasites re-appeared in the blood. Gave quinine again—grs. V. four-hourly. Mist Sternberg two-hourly.

No vomiting occurred to-day. Anæmia and icterus very pronounced.

11th December, 1913. Urine normal in colour but loaded with urates. S. G. 1012. A few granular casts. Blood free from parasites. Bowels free—normal stools. Reduced quinine to grs. V. bis in die. Sternberg mixture every three hours. No vomiting. Troubled with large internal piles and toothache. Former treated with ice. Creosote relieved latter.

12th December, 1913.—Urine normal. Icterus passing off. Hæmoglobin index, 30 per cent.

14th December, 1913.—Convalescent. Sternberg's mixture thrice daily.

16th December, 1913.—Urine continues quite clear and free from deposit. Taking food well. Constipation troublesome, but no further trouble from piles. Sternberg's mixture stopped. Quinine, grs. V. daily.

18th December, 1913.—Improvement maintained. Tab. ferri et arsenic. co. two, three times a day. Discharged from hospital at own request to settle private affairs previous to departure for England.

19th December, 1913.—Continues well. Hæmoglobin index, 50 per cent.

T. H. DUGON,
Medical Officer.

NYASALAND.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 10th March, 1914.)

Government House, Zomba, Nyasaland Protectorate,
31st January, 1914.

SIR, I HAVE the honour to transmit the annual report on cases of blackwater fever in the Nyasaland Protectorate during the year ended the 31st of December, 1913, together with a map* showing the localities in which the cases occurred.

2. Since the present report is rendered in respect of the calendar year, instead of the financial year as heretofore, it includes three cases (Nos. 1, 3 and 4) which occurred during the last quarter of the financial year 1912-13, and were reported on in the return for that year.

I have, &c.,
G. SMITH,
Governor.

Office of the Principal Medical Officer, Zomba,
Nyasaland Protectorate, 21st January, 1914.

SIR, I HAVE the honour to submit, in triplicate, a return of cases of blackwater fever for the year ended the 31st of December, 1913.

Of the seven cases recorded, all were males; six Europeans and one Indian.

Six of these cases recovered, and one (Indian) died.

It is noteworthy that four had previously had one attack of blackwater fever, periods of 14 months, 7 years, 7 years, and 10 years, respectively, having intervened between the two. In the remaining three it was the first attack.

Four of the patients were by occupation planters; one a Portuguese officer; one an employee of the Portuguese Nyasa Company; and one an assistant stationmaster (Indian) of the Nyasaland Railway.

As regards seasonal prevalence, three of these cases occurred during the rains; one shortly after the rains; two during the fairly cool, and one during the warm, dry season.

With reference to locality, five of the cases occurred in the Shiré Highlands (one of these, however, developed his attack immediately on arrival from the neighbourhood of Lake Chiuta); one on the Lower River; and one at the south-eastern border of the lake.

It is necessary to add that Cases 1, 3 and 4 were included in last year's return, these cases having occurred in the last quarter of the past financial year.

I have, &c.,
H. HEARSEY,
Principal Medical Officer.

The Honourable
the Acting Government Secretary.

RETURN OF CASES OF BLACKWATER FEVER DURING THE YEAR ENDED THE 31ST DECEMBER, 1913.

CASE 1.

PORT HERALD. (LOWER SHIRÉ.)

(*Vide* [Cd. 7211], CASE 24, PAGES 29 AND 30.)

* Not reproduced.

CASE 2.

BLANTYRE (SHIRÉ HIGHLANDS).

Male, aged 33; admitted 26th April, 1913.

I. *History*.—The patient has been 12 years in tropical Africa, and has resided nowhere else in the tropics. Of these 12 years eleven were spent on the Lower river, running a stern-wheeler, and one in the hills. During his first two years he had three severe attacks of malaria (bilious remittent). In 1906 he had blackwater fever. Since then, though he has frequently had slight fever, and felt seedy, he has never been actually laid up.

II. *Insects*.—Has been badly bitten by mosquitoes, but has no recollection of being bitten by other flies. Has been bitten by bugs in his present residence, but had not been bitten by them before his 1906 attack of blackwater.

III. He lives about 20 miles out of Blantyre. His house presents a remarkable health record, as follows:—

- (1) The original occupant died on the way home. He is said to have died of malaria.
- (2) The second occupant, an Italian, was found dead in bed by myself in 1906, having died about two hours before I reached him; his temperature when I saw him was 104°, and there was no doubt he died of severe malaria.
- (3) The third occupant suffered various severe attacks of malaria, and eventually died in Zomba Hospital from an attack of blackwater.
- (4) The present patient went to live there on the 20th August, 1912, and developed blackwater on the 26th April, 1913. At present the house is unoccupied.

IV. *History of present illness*.—Patient has taken quinine irregularly, when he “felt seedy.” Before the present attack he took grs. X for three consecutive days. It is frequently the case that persons coming to the uplands from the lower levels regard them as quite healthy, and neglect quinine and other prophylactic measures.

Patient was admitted on the 26th April, 1913. Temperature 100°, pulse 72, much jaundiced. In six hours passed 30 ounces urine, very dark, port-wine colour. Blood examined, no parasites found. Liver and spleen both enlarged. Was ordered normal saline injections per rectum, three hourly, if awake.

27th.—Injections fairly well retained, but patient vomited twice and had a rigor; during the day his urine became clearer coloured and was copious, but patient was extremely restless. Was given milk and soda and plain soda only. Injections continued. At 6.45 p.m. I gave him morphia sulphate, $\frac{1}{4}$ gr., hypodermically; after this he slept till 9.30, and after that dozed all night. Vomiting ceased.

28th.—He now retained fluid nourishment well and passed copious light-coloured urine. Four capsules oleum ricini given. This followed later on by an enema, which acted well. Again this night he had a hypodermic injection of gr. $\frac{1}{4}$ morphia and slept well.

29th.—Saline injections were continued, chicken tea, Brand’s essence, &c., given by mouth, all retained. Urine copious and light coloured, with a trace of albumen and hæmoglobin.

30th.—Slept well and asked for food. From now on the case steadily improved, and was discharged on May 14th. On the 5th May I again searched carefully for parasites, but failed to find any. Severe anæmia was present, and the patient was put on dialysed iron, from which he derived marked benefit. I regard this case as severe tropical blackwater with no complications.

A. H. BARCLAY, Medical Officer,
Blantyre.

CASE 3.

(*Vide* [Cd. 7211], Case 29, pages 33 and 34.)

CASE 4.

(*Vide* [Cd. 7211], Case 30, page 34.)

CASE 5.

MLANJE. (SHIRÉ HIGHLANDS.)

A planter, aged 35, 11th August, 1913.

I. *Locality*.—Ruo river is half a mile distant. Clearances of bush extend for a quarter of a mile on all sides of the house. A swamp is situated at 200 yards distance, and numerous larvæ—anophelinæ and culicinæ—were easily found. Elevation under 2,000 feet.

(b) Exactly two years previously the resident in a house 150 yards distant had an attack of blackwater. No native dwellings are within quarter of a mile. As an estate manager the patient is constantly coming into contact with natives.

(c) *A. costalis* and *stegomyia* were found in the house. *G. brevipalpis* has been reported within two miles. *Stomoxys* were numerous about a quarter of a mile distant.

II.—The time of onset was the cold season, maximum temperature about 70° F., minimum, 48°-50° F.

III.—(a) Previous attack of blackwater ten years before. This was followed by eight years of good health. Residence in tropics (North-Eastern Rhodesia and Nyasaland) of 13 years; first attack of blackwater occurred in the Red Sea on way to England. His occupation had always been indoors until this year.

(b) About 15 months ago, for two weeks, the patient suffered from malaria in Blantyre, and for the last three months, before the blackwater attack, he had not been fit. Otherwise he has enjoyed excellent health.

Quinine.—Five grains daily. Had not been taken with much regularity. His home conditions are of the best.

(c) *Blood*.—No examination was made while the blackwater continued, but on the fourth day the examination for malarial parasites was negative. On the twelfth day the examination was again negative.

Treatment.—Rectal salines four-hourly; sod. bicarb. and hydrarg. perchlor. (Hearsey's formula); fluid diet; alcohol was given on the fourth day in the form of champagne; quinine was begun on the twelfth day, and is being continued regularly.

ROBERT DRUMMOND,
Medical Officer,
Mlanje.

CASE 6.

ZOMBA. (NEIGHBOURHOOD OF LAKES CHIUTA AND AMARAMBA.)

European (non-official), aged 40.

I.—(a) Patient has been employed for a number of months past surveying the Anglo-Portuguese boundary in the neighbourhood of the marshy lakes Chiuta and Amaramba. He states that he has not suffered from malaria during that time, and has taken no quinine.

(b) Other cases of blackwater fever have come during past years from this district, but I have no data about them.

(c) Mosquitoes and biting flies are very numerous in this district, including *Anopheles costalis*, *A. funestus*, *A. mauritianus*, *A. squamosus*, *A. maculipennis*, *A. transvaalensis*, *Stegomyia simpsoni*, *Mansonioides uniformis*, *Culex pipiens*, *C. quasigolidus*, *C. univittatus*, *Tabanus africanus*, *T. par*, *T. unitæniatus*, *T. tæniola*, *Hæmatopota pertinens*, *H. rubens*, *Glossina morsitans*, *Stomoxys calcitrans*.

II.—The case has occurred at the beginning of the rainy season when other cases are commonly seen.

III.—(a) Patient has spent many years in various parts of Africa, and has had several attacks of malaria at various times in the past, but not blackwater fever. He is an irregular quinine taker.

(b) Patient has been subjected to the vicissitudes of camp life for several months.

(c) The interesting feature in the case is the co-existence of a fairly heavy benign tertian malarial infection.

History of case.—Having completed his field work the patient came to Zomba to complete his work some ten days before being taken ill.

On evening of 29th November, 1913, he felt feverish, but thought nothing of it, but the following morning at 6 a.m. he took 10 grains of quinine in tabloid form—a little later he rose from his bed, had a shivering attack, and shortly afterwards, about 7 a.m., he passed "blackwater."

The bowels were open at 8 a.m., but there was no vomiting, and patient did not feel very ill.

He was seen by me at 10.30 and admitted to hospital at noon.

On admission: A well-nourished man with above history, but no symptoms. Temperature, 102.4° F.; pulse 120. Very slight icteric tint to conjunctivæ.

On examination: Physical signs over chest and abdomen normal, with the exception of enlargement of the spleen, which reached three inches below the costal margin. Heart sounds rather soft and of tic-tac rhythm.

Urine of a bright cherry colour; sp. gr. 1020; acid; no deposit; a small amount of albumen present; no sugar.

Microscopically: No red cells present; spectroscopic examination revealed the typical spectrum of oxy-hæmoglobin; guaiacum test for blood very slight.

Examination of the blood revealed a fairly heavy infection, with benign tertian malaria parasites. No leucocytosis. In the evening a rigor occurred lasting half an hour, during which the patient vomited four times; he perspired freely throughout, and the temperature fell from 100° to 99°.

The further history of the case is uneventful; the temperature never rose above 99° after the first two days, and was normal from the sixth to the eleventh days. The pulse gradually slowed down from 120 to 80 per minute, and improved in tension.

The spleen gradually receded under the costal margin, but was still just palpable when he left hospital.

The jaundice which, while most evident on the third day, was never more than slightly marked, disappeared by the sixth day.

The urine measurement remained good throughout under treatment at about 60-70 ounces. It commenced to clear on the fourth day, and remained clear after the fifth day. Frequency of micturition was rather troublesome at first, but cleared up later.

On the tenth day patient's demands to be discharged from hospital were acceded to under protest, from which date he was lost sight of.

He was advised to commence taking quinine in a week's time, beginning with one grain a day, working up to 15 grains a day.

The changes in the blood picture were those of progressive anæmia, the number of red cells rapidly being diminished, with the occurrence of shadow forms, polychromatophilia, poikilocytosis, and nucleated cells, with an increase of the epithelioid type of mononuclear white cells. Malaria parasites became increasingly difficult to find after the third day. Only one cell was noticed containing what might have been a cell inclusion. No other malaria or other parasites were noted.

The treatment consisted of rest in bed with use of bed pan; the administration of calomel at the commencement; milk and chicken broth diet, plus three pints of water per diem containing two drams of sodium bicarbonate to the pint.

H. S. STANNUS, Medical Officer,
Zomba.

CASE 7.

FORT JOHNSTON.

A trader, age 32.

Admitted to Fort Johnston Hospital at 4 p.m., May 13th, 1913.

He came into hospital after a journey of nine hours by machila.

He said his illness commenced on Saturday, May 10th, on which day he had a

severe rigor, and afterwards got very hot; on passing water he noticed his urine was dark.

The following day, May 11th, he had another severe rigor. On May 12th (the day before admission) he took a dose of Epsom salts, which, he says, worked his bowels very well.

About six days before the beginning of the present attack he felt out of sorts and took a tabloid of quinine (25 grains).

After this he took no drugs of any sort until he took the Epsom salts on the 12th.

Past history:—

Patient has been fourteen months in Africa—this being his first tour of African service.

Since coming to Africa he has had frequent attacks of fever; he reckons he has had an attack about every three months.

He had dysentery about a year ago.

He had lues some years ago.

He uses a mosquito net.

He does not take quinine as a prophylactic measure, but takes it when he feels the fever abating after an attack.

Present illness:—

On admission his pulse was 66 and his temperature 100·8° F.; jaundice was very marked; there was no apparent enlargement of liver or spleen.

Just after admission he passed three and a half ounces of very dark red urine.

He complained of epigastric, hypogastric, and lumbar pains. Epigastric tenderness was noticeable.

Headache was also present.

Continuation and course of the illness:—

Urine.—The first specimen of urine passed was very dark red in colour—much deeper than port wine—and on standing separated into the usual greyish and red layers.

The sediment of the greyish layer contained much epithelium, also hæmoglobin granular casts, and hyaline casts. The colour gradually cleared in succeeding specimens until on the morning of the 15th it was quite free from hæmoglobin.

The hæmoglobin re-appeared, however, in a specimen passed at 11 a.m., and then disappeared until the 23rd, the fourteenth day of the disease, when there was another paroxysm.

Albumen was present in the urine until May the 30th, when it finally disappeared. It was never present in any great quantity, and could not be measured by the albuminometer.

The quantity of urine passed was always abundant.

Blood examination.—Slides were made (both fresh and stained) on May the 14th and again on May 17th.

No malaria parasites were found.

Jaundice.—The icterus reached its maximum intensity on May 14th, and gradually faded, finally disappearing about May 30th.

There was, however, a marked increase in intensity after the hæmoglobinuric relapse of May 23rd.

Vomiting.—This was never a very severe symptom in this case.

Treatment.—The patient all along took liquids—water and milk—well, and passed copious quantities of urine, so that treatment by rectal salines was deemed unnecessary.

Sodium bicarbonate in ten grain doses was given on May the 14th, 15th, and 16th, with a view to correct any tendency to vomit or retch, and was then discontinued.

For the lumbar and abdominal pains hot water bottles and mustard leaves were used. Quinine, magnesium sulphate, and morphia were administered.

Locality.—The disease was contracted in Portuguese territory.

R. BURY, Medical Officer,
Fort Johnston.

GAMBIA.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 30th January, 1914.)

SIR, Government House, Bathurst, Gambia, 10th January, 1914.
I HAVE the honour to inform you that no cases of blackwater fever occurred in the Gambia during the year 1913—*vide* Dr. Mayer's report, enclosed herewith.

I have, &c.,
H. L. GALWAY,
Governor and Commander-in-Chief.

ANNUAL REPORT ON BLACKWATER FEVER, GAMBIA, 1913.

THE HONOURABLE THE COLONIAL SECRETARY, Bathurst, R.G.
No case of blackwater fever occurred in this Colony or Protectorate in 1913.
T. F. G. MAYER,
Acting Senior Medical Officer.

Medical Office,
Bathurst, R.G.,
10th January, 1914.

UGANDA PROTECTORATE.

REPORT ON CASES OF BLACKWATER FEVER DURING THE YEAR 1913.

Blackwater fever shows an increased incidence during the year in proportion to the increase in susceptible population,* but the mortality is rather below the average for the four preceding years.

There were 58 cases reported during the year, of which 12 were fatal, giving a death-rate of 20 per cent. Of these 35 were returned by Government Hospitals and 23 (excluding five also returned by Government Hospitals) by the Church Missionary Society's Hospital at Kampala.

The figures for previous years have been as follows :—

1909	...	...	21	cases	with	6	deaths,	mortality	28·5	per	cent.
1910	...	...	26	„	„	6	„	„	23·0	„	„
1911	...	...	18	„	„	3	„	„	16·6	„	„
1912	...	...	45	„	„	9	„	„	20·0	„	„

Sex.—Of the total cases two were females and 56 males.

Age.—There were three children, aged 4, 7, and 13, respectively, and the remaining cases varied in age from 19 to 60, but were chiefly young adults.

Nationality.—There were 19 Europeans and 39 Asiatics.

Deaths.—There were two deaths among Europeans and 10 among Asiatics. Of the European cases four were in Government employ, of which none were fatal, and of the Asiatic cases 12 were in Government employ and two were fatal.

* In 1913 the European and Asiatic populations were 823 and 3,110 respectively. In 1912 they were 640 and 2,216 respectively.

Locality.—Some relation of attacks to surroundings appears to be shown in Kampala Township. In the Indian Bazaar at Kampala 11 cases occurred, and in the Asiatic Clerks' quarters five cases. The general conditions in the Indian Bazaar at Kampala were insanitary, and included constant exposure to malarial infection and overcrowding. Pools of stagnant water, which have since been filled up, existed during the year near the Asiatic Clerks' quarters, and in addition most of the clerks have friends in the bazaar, and visit it after sundown. Malaria was very frequent during the year, both in the bazaar and in the clerks' quarters. In the vicinity of Kakindu, on the Nile, which is known to be a very malarious district, five cases originated. The other cases were scattered, and beyond what has been stated above no definite relation of an attack to any particular class of surroundings was shown. In 42 cases the disease appears to have been contracted in a town or station, and in 16 in outlying districts, or while travelling.

Two cases occurred in the same house at Jinja in August and October, respectively.

All the patients had been exposed to the bites of mosquitoes, including anophelines, and some had also been exposed to the bites of simuliidæ, stomoxys, *Ornithodoros moubata*, and other insects. In one case it was suspected that tick fever was concurrent with the attack of blackwater fever. (See Appendix No. 1.)

The following chart shows the stations from which cases of blackwater fever were returned, and the months in which they occurred :—

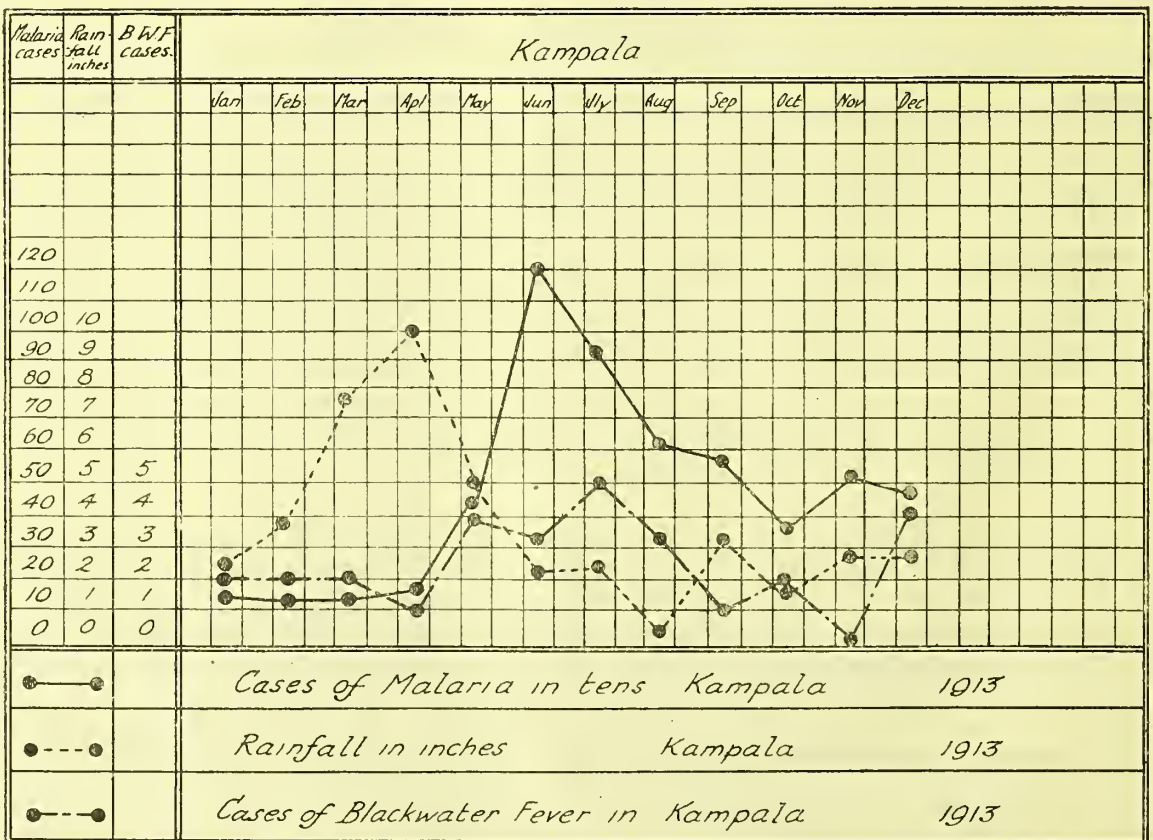
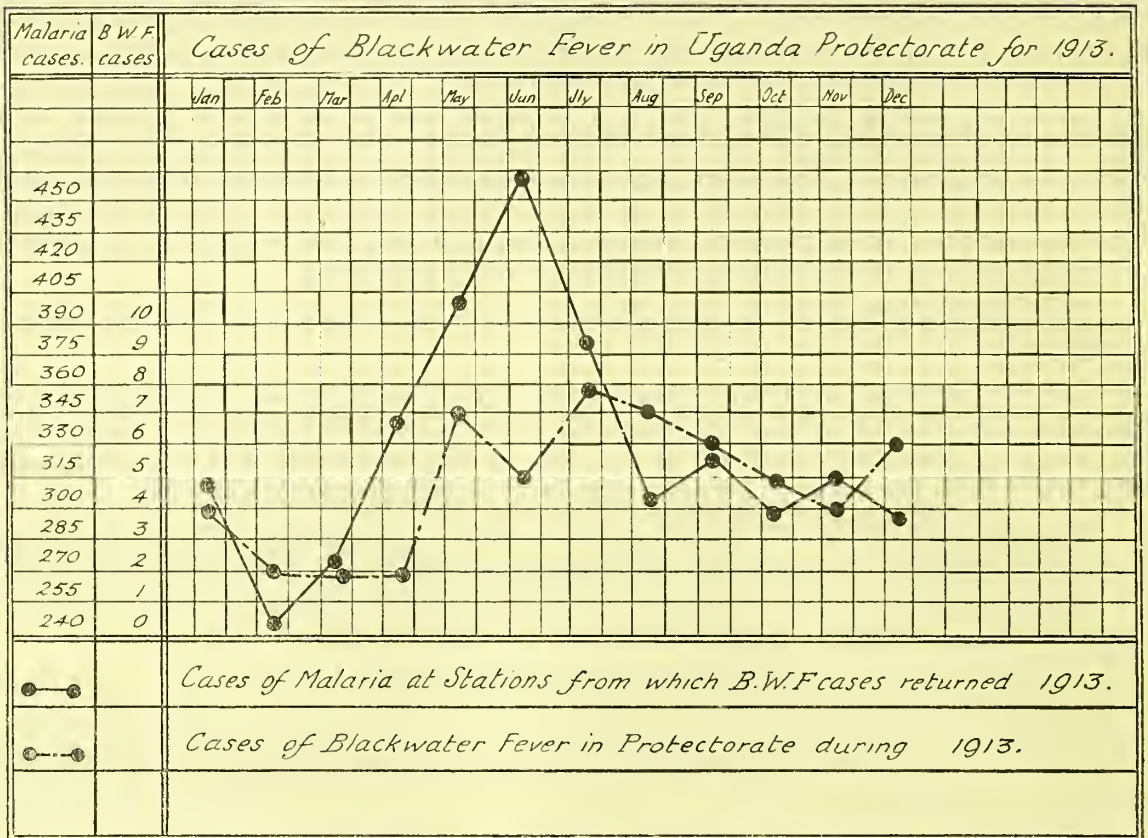
Blackwater Fever Chart, 1913.

—	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Totals.	Deaths.
Entebbe ...	—	—	—	—	—	1	2 ¹	—	2	1	2 ¹	1	9	2
Fort Portal ...	—	—	—	—	—	1	—	—	—	—	—	—	1	
Hoima ...	1	—	—	—	—	—	—	—	—	—	—	—	1	
Jinja ...	1 ¹	—	—	1 ¹	—	—	—	2	1	2	—	—	7	2
Kakindu ...	—	—	—	—	1	—	—	1 ¹	—	—	1 ¹	—	3	2
Kampala ...	2	2	2 ¹	1	5	3 ¹	6 ¹	3	2 ¹	2 ¹	—	5 ¹	33	6
Kumi ...	—	—	—	—	—	—	—	—	1	—	—	—	1	
Masindi Port ...	—	—	—	—	—	—	—	—	—	—	1	—	1	
Mbale ...	—	—	—	—	1	—	—	—	—	—	—	—	1	
Butiaba ...	—	—	—	—	—	—	—	1	—	—	—	—	1	
Total Cases	4	2	2	2	7	5	8	7	6	5	4	6	58	12

It will be seen from the chart that 33 cases, or more than half, are returned from Kampala. Although this is the largest centre of native and Asiatic population, and five of the cases originated elsewhere, the proportion is still excessive. Of the European cases, 11 out of a total of 19 are returned from Kampala, but four of these originated elsewhere, and were either brought in for treatment or medically visited from Kampala. Of the nine cases reported from Entebbe, one originated elsewhere, and of the seven cases returned from Jinja, two originated elsewhere, as did the single cases returned from Hoima, Fort Portal, Kumi, and Masindi Port.

The greatest number of cases occurred during May to September, the months following the rainy season, and a second slight rise is seen in December, following the lesser rains in September, October, and November. In the following charts for

the Protectorate and Kampala and Entebbe stations a similar relationship is also shown, and the seasonal incidence of malaria is given for comparison.





Personal history:—

(a) Previous blackwater fever.—Of the 58 cases, 20 had had previous attacks, and of these two had had five, one four, three three and two attacks. Previous attacks had occurred in four of the 12 fatal cases.

(b) Previous malaria.—In 57 cases there was either a history of malaria or spleen enlargement. In most cases the attacks had been frequent.

(c) Quinine habits.—In ten cases quinine was stated to have been taken regularly, and in 29 cases irregularly. In 13 cases no quinine was taken, and in six cases there is no record. Among the 12 fatal cases none had taken quinine regularly, seven had taken it irregularly, three had taken none, and of two there is no record.

(d) Quinine is cited as an additional exciting cause of the attack in five cases, and in one case, in which 30 grains of quinine were taken on two consecutive days preceding the attack, as the sole exciting cause. None of these attacks was fatal, and all occurred during malaria.

(e) Other exciting causes.—Chill during fever is given in 20 cases, exposure or over-exertion, or both, in eight cases, and reckless disregard of health in three cases.

(f) Length of residence in Africa varied from six weeks to twenty-two years. In four cases it was over ten years, and in four cases under one year. Of the latter one case had been resident only six weeks, but had been seven years in Siam, two had been in Uganda six months, but these were both Asiatics, and had been exposed to malarial infection previously. One was a European who had been in Africa ten months. He stated that he had taken, as a rule, five grains of quinine daily: he was acting as engineer on a Lake Albert and Nile steamer, and was much exposed to malarial infection. He had had several attacks of malaria previously.

Presence of parasites.—In four cases malaria parasites were found before the hæmaturia commenced; in one of these they were also found afterwards during the illness. In one other case parasites were found after the attack commenced. In two cases the presence of parasites is recorded, in one 17 days, and in one a month after the attack, but examination at the time had given negative results. In 17 cases the result of examination was negative, and in 36 there is no record.

The duration of hæmoglobinuria in the cases in which this detail is recorded was from one to four days. The average was rather less than three days.

Relation to malaria.—The cases continue to show, as in previous reports, a definite relation between blackwater fever and malaria. On the whole they strongly support the idea that blackwater fever occurs most frequently in those who suffer from prolonged infection or constant re-infection with malaria, especially where treatment has been absent or insufficient.

Attached hereto are four Appendices, of which 2, 3, and 4 are maps* of the Uganda Protectorate, of Entebbe, and of Kampala showing the localities in which cases originated.

A. D. P. HODGES,

Principal Medical Officer,

Uganda Protectorate.

Entebbe,

28th April, 1914.

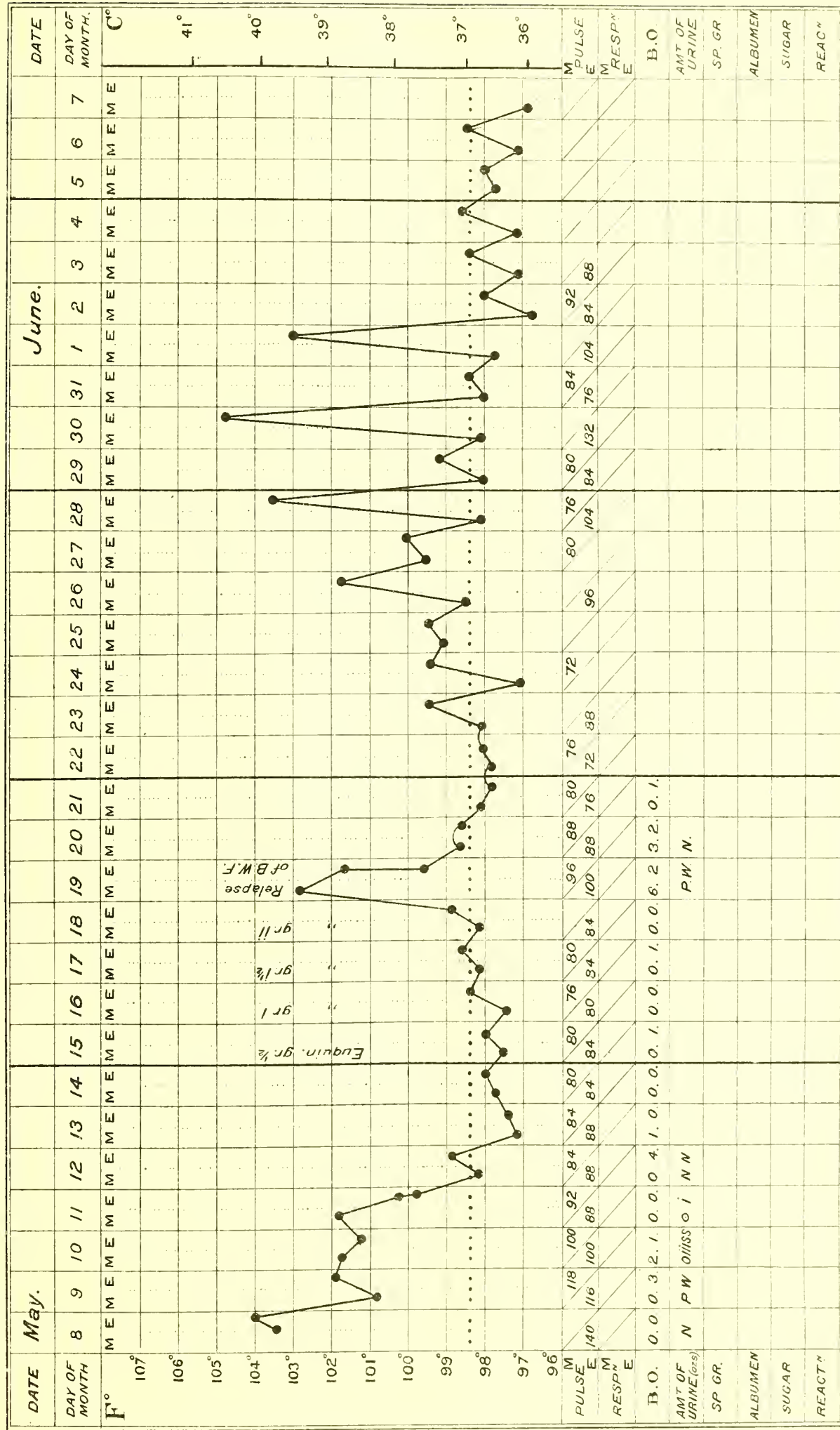
APPENDIX I.

I would venture to draw your attention to a series of cases which I believe exist where the predisposing cause is an attack not of malaria but of spirillum fever. I do not, of course, put this forward as the common predisposing cause; but I suggest that it occurs in a certain number of cases, thus:—

- (i.) In the case of a member of our mission, who died of blackwater fever. His first attack occurred in Toro in 1906. I treated him at the time, and *found no malaria* in his blood, but spirilla in abundance. The blackwater fever cleared up (*i.e.*, the hæmaturia did) in two days. The first relapse of the spirillum fever occurred eight days later, and with it a relapse of the hæmaturia. Subsequently, a few years later, he again contracted spirillum fever, with typical relapses of temperature, and *died of blackwater fever* in a relapse of the spirillum fever.
- (ii.) One patient in 1907 had a typical attack of spirillum fever, with three fortnightly relapses. In the third relapse he took a cold bath, and immediately severe blackwater fever occurred. I examined his blood and found *no malaria*, though it is also true I found no spirilla either, but they are often difficult to find, *i.e.*, harder than malaria.
- (iii.) I enclose a chart of one of our blackwater fever cases. I would suggest that this chart is strongly suggestive of spirillum fever, and that that suggestion is further borne out by the presence of *Irido cyclitis* with *Keratitis punctata* as a complication in his case.
I venture to think that if search were made through the charts of blackwater fever cases in Uganda a certain number would be of this type, which we might call a "spirillar type of blackwater fever" as distinguished from the commoner "malarial type of blackwater fever."
- (iv.) Redwater fever of cattle has, I believe, been proved due to the bite of a tick. It would be interesting if human hæmoglobinuric fever were also sometimes due to the bite of an infective tick (the *Ornithodoros moubata*) which is known to produce the spirillum fever.
- (v.) If this be so, and the point could surely be proved by a more systematic examination of blood in blackwater fever cases, or even by a search of past records, then it would be a tempting hypothesis to assume that the long sought cause of blackwater fever may be some active agent (? germ *sui generis*, ultra microscopic, or otherwise) acting upon blood corpuscles already impoverished by the toxins of malarial germs (generally) or spirillum (sometimes). Or, again, if Moffat's theory be correct, then that a chill may cause abortion of malaria containing red corpuscles, or disintegration of corpuscles whose nutrition has been undermined by spirilla.

* Not reproduced.

CASE OF M.R.Z.





Case alluded to in (iii.) above:—

1. Station.—Kampala.
2. Date.—May 8th-June 7th, 1913.
3. Nationality.—German.
4. Age.—35.
5. Sex.—Male.
6. Date placed on sick-list.—May 8th, 1913.
7. Where contracted.—On safari.
8. Previous attacks of malaria.—Had been ill for three months with “Fever” at Mwanza. Spleen “very enlarged and tender.” Reached level of iliac crest on May 29th.
9. Previous attacks of blackwater fever.—Never had blackwater before
10. Attributed cause of attack.—Chill during fever.
11. Blood examination.—Not made.
12. Length of residence in Africa.—Not stated.
13. Locality.—Had arrived at Kampala.
14. Previous cases in same place.—About 20-30 cases a year come to this hospital from the township of Kampala.
15. Insect fauna.—Anopheles prevalent, also in certain houses the *Ornithodoros moubata*.
16. Seasonal variation.—January one case, February two cases, March two cases, April one case, May five cases, June two cases, July five cases, August two cases, September two cases, October two cases, November nil, and December five cases, were admitted to hospital.
17. Habits of patient with regard to quinine.—Said he could never take quinine, and did not, therefore, take it. During residence in hospital even 2 gr. of euquinine (after rising by a daily increase of gr. $\frac{1}{3}$ from gr. $\frac{1}{2}$) gave a relapse of hæmaturia.
18. Previous movements of patient, and personal condition to which he has been subject.—Safari life.
19. Result.—Recovered.
20. Other details.—Four interesting features in this case:—
 - (1) Susceptibility to quinine and euquinine in small doses.
 - (2) Patient had *Keratitis punctata*, and two small hæmorrhages on temporal side of disc very near the centre of the macula lutea. The *Keratitis punctata* pointed to a past history of spirillum fever.
 - (3) Though he could not take quinine or euquinine the fever subsided and symptoms cleared directly he began taking methylene blue in gr. 2 doses.
 - (4) The temperature chart* was suggestive strongly of a spirillum fever with three relapses.

J. HOWARD COOK,

C. M. S. Hospital, Kampala.

The cases given by Dr. Cook and his remarks on them are of particular interest.

I have not myself seen cases of blackwater fever with pyrexia of a spirillar type, but there is no reason to suppose that tick fever may not sometimes act as a predisposing cause, and it is known that tick fever and malaria sometimes exist concurrently in the same patient.

A. D. P. HODGES,

Principal Medical Officer.

* See opposite page.

NORTHERN NIGERIA.

The Principal Medical Officer, in forwarding the report on "Blackwater fever in Northern Nigeria for the year 1913," states :—

Seventeen cases of the disease, as against fourteen in 1912, were reported, of which number I am able to record full particulars in fifteen instances. Owing to the impossibility of obtaining the necessary information from the Medical Practitioner in attendance, one case has been necessarily omitted from the tabulated return, whilst the non-inclusion of a second case is accounted for by the fact that the patient was not professionally attended. Both the two latter cases, which terminated fatally, have, however, been embodied in the statistical charts which accompany this report.

Sixteen Europeans and one Syrian were attacked; the results in six instances proved fatal, giving a mortality percentage of 35·29 as compared with 24·7, the average for the past sixteen years.

As regards the geographical distribution of the cases, as in previous years it cannot, in my opinion, be concluded that any one district or province of the Protectorate is more affected than is another.

The cases are naturally more in number where the European population is highest, hence the marked recent increase in the number of cases occurring in the mining areas, mainly situated in the Central Province. Reference to the tabulated return will show that 11 cases occurred in places where previous attacks are on record in the immediate vicinity; whilst cases numbered 1, 4, 6, 7 and 11 occurred in the larger and older established stations, viz., Zungeru, Lokoja, Zaria and Naraguta.

The natural surroundings of the places of incidence are, however, widely diverse, ranging from the banks of rivers and streams in low-lying districts, to the plateau of the high altitude. In nine of the tabulated instances the surroundings appear to be free from dense bush and swamp, and in the majority of cases the stations and camps are reported as being well cleared.

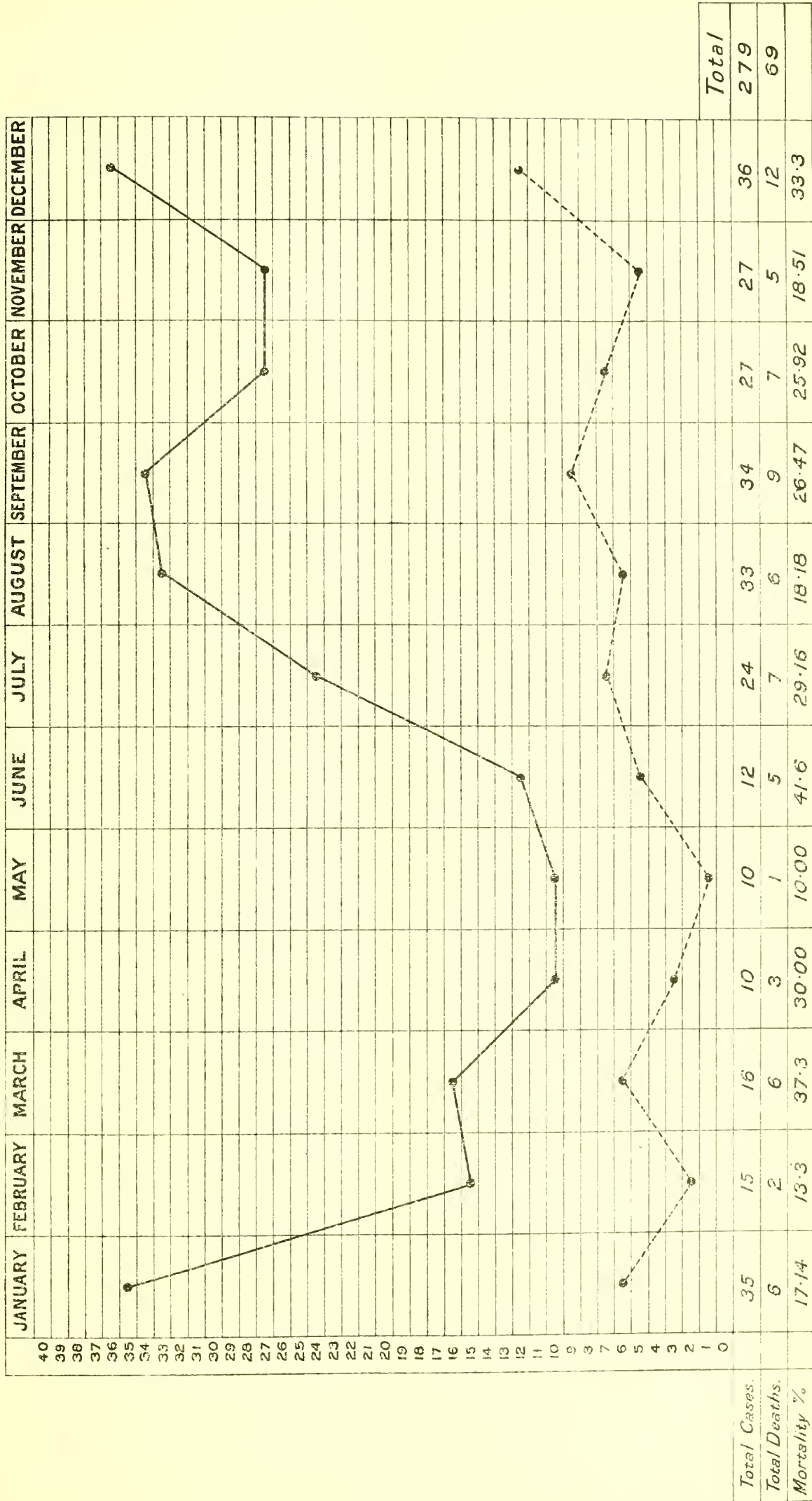
The prevalence of mosquitoes was reported as being general, anopheles, stegomyia and culex being found in large numbers in nearly every affected locality; bugs, biting flies, and ticks were, however, in many cases conspicuously absent.

The seasonal variation points to the fact that eight of the patients were attacked during the rainy season, three in the harmattan season, and four during the hot weather. It is perhaps worthy of comment that these figures are relatively correspondent to the records for previously recorded years.

The remaining information is detailed on the tabulated return under the prescribed headings, and I can only reiterate the opinions expressed in the two previous reports.

BLACKWATER FEVER.

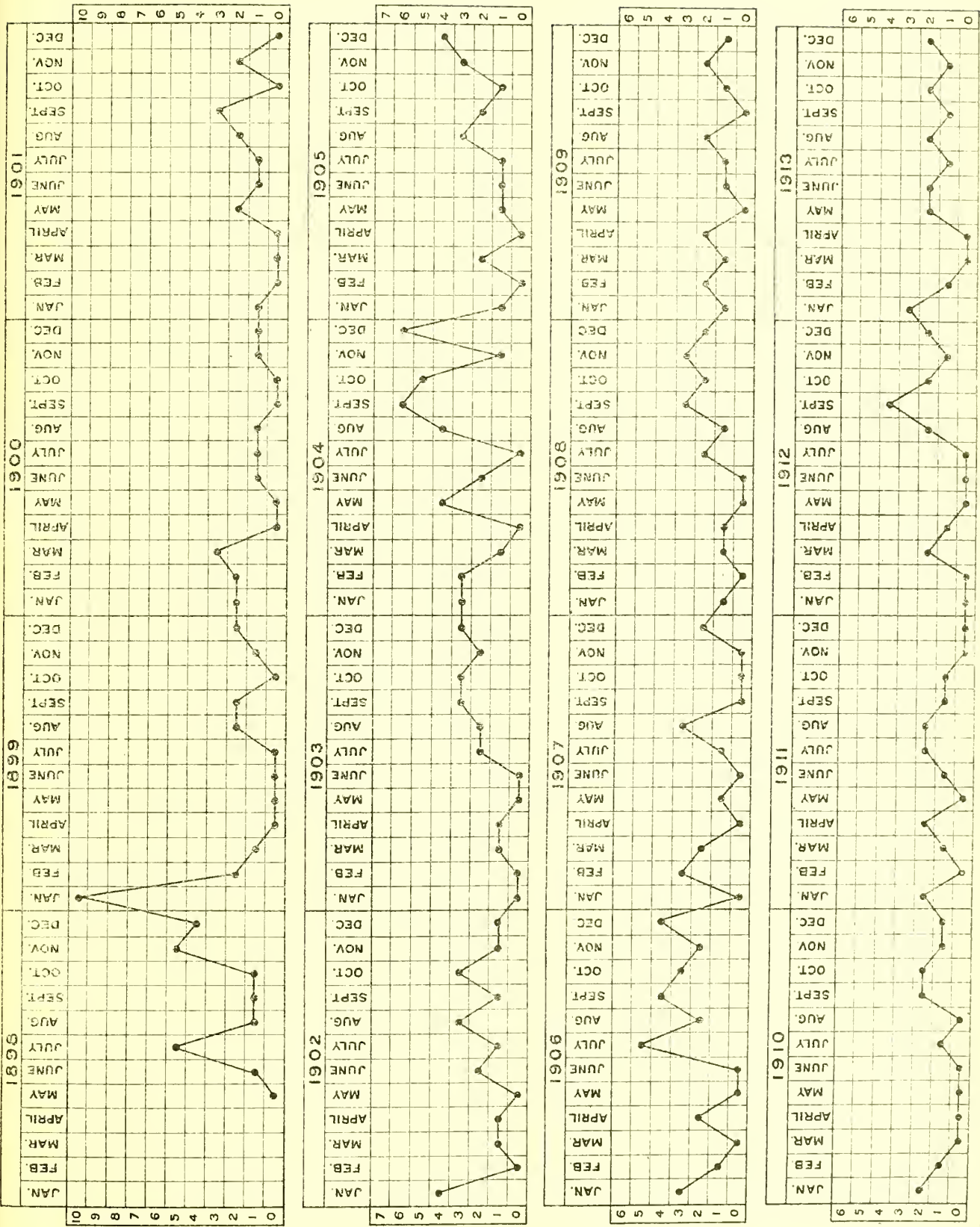
MONTHLY INCIDENCE OF CASES AND DEATHS, 1898-1913 INCLUSIVE.



Horizontal lines represent Number of Cases.
Dotted line represents Fatal Cases.



MONTHLY AND YEARLY INCIDENCE OF CASES OF BLACKWATER FEVER FOR THE PAST 16 YEARS.





REPORT ON CASES OF BLACKWATER FEVER IN NORTHERN NIGERIA, 1913.

47

Number of case and result.	Locality.			Seasonal Variation.	Personal History.		
	(A.) Physical Features.	(B.) Occurrence of a Series of Cases.	(C.) Insect Fauna.		(A.) Medical History.	(B.) Previous Movements and Personal Conditions.	(C.) Microscopic Examination of the Blood.
1. Recovery	Open undulating country. No bush or swamps in vicinity of bungalow.	8 cases 1906; 3 cases 1908; 2 cases 1910.	Anopheles, Culex, Stegomyia, <i>Lyporossia minuta</i> , <i>Glossina tachinoides</i> and <i>palpalis</i> (both scarce this year), <i>Culicoides</i> .	Middle of dry season. Slight harmattan.	No previous illness here. Took quinine daily.	Only two months in West Africa. Previously served in India. European built house.	Examination revealed a few small ring forms of malarial parasites.
2. Recovery	Open country with very little bush. Sandy soil.	1 fatal case, 1912	Anopheles, Stegomyia, Culex, Hippoboscidae, Lyperosia.	Harmattan season. Very cold nights.	No previous illness. Took quinine daily.	Resident in W.A. four years. Is a native of Syria, lived in a partially completed mud house.	No parasites found.
3. Death ...	Bare rocky surroundings. Stream round two sides of camp.	1 case in 1912 ...	Mosquitoes, Sand flies, and Ticks.	Harmattan season. Cold nights.	Had "fever" often. Took quinine irregularly.	Had been 1 year in Canada and previously served on the Coast as a miner. Lived in a good mud house.	No examination possible.
1. Recovery	Bank of River Niger. Swamps. Station well cleared of bush.	3 cases in 1912, 2 of which in same quarter.	Culex, Stegomyia, <i>Culicoides</i> , Tabanus.	Exceptionally hot season. Mean shade temperature previous month 100° F.	Had five attacks of malaria. Took quinine regularly.	18½ months in W.A. Served in Lagos, Warri and Zungeru during tour. European built house. No previous tropical experience.	No parasites found.
5. Recovery	Plateau surrounded by ridge of hills. No forest, but plenty of scrub.	Nil	Anopheles, Culex, Muscidae. No ticks or other insects observed.	Tornado season ...	Frequently suffered from "fever." Had not taken quinine for months.	Eighth month of fourth tour of service. No previous tropical experience. Was much exposed to sun. Housing not good.	No parasites found.

6. Death ...	Bank of River Niger. This patient practically lived on the Niger for two months in a hulk.	3 in 1912; 1 in 1913.	Anopheles, Culex, Stegomyia, Glossina, Tabanus.	Rainy season ...	Was under treatment for debility in 1911. A regular quinine taker.	Fourth month of second tour. Previously served in India. Had moved about on the Niger a good deal.	No parasites found.
7. Death ...	Plateau. Camp situated 150 yards from river; surrounding bush of thin variety.	1 case in 1911; 1 case in 1912. Both in this neighbourhood.	Anopheles, Culex, Stegomyia. No evidence of other biting flies, ticks, bugs, &c.	Rainy season ...	Suffered from gastric trouble for two months previous to the black-water fever. A regular quinine taker.	Fourth month of second tour. Had spent most of his life gold-mining in Australia. Was accommodated in a good mud house.	No parasites found.
8. Recovery	A high plateau (3,200 feet) surrounded by hills. Small swampy areas in wet season.	One case a few miles off, in 1913. (See 5.)	Anopheles, Culex, Muscidae. No bugs or ticks.	Rainy season ...	Had several attacks of malaria recently. Does not take prophylactic dose of quinine.	Ninth month of second tour. Has worked for three years in South America and also in India. Lived in good mud house.	No examination possible.
9. Recovery	Cultivated land; well wooded. No swamps.	One case 18 miles off, in 1912.	Anopheles, Culex, Stegomyia. Sand-flies very numerous. Ticks on animals in the district.	Rainy season ...	Had three previous attacks of blackwater fever in 1905, 1906 and 1906. Prior to those attacks he suffered repeatedly from malaria. Had no malaria since 1907. A regular quinine taker.	South Africa 1899-1903; Northern Nigeria 1904-1907; Portuguese Guinea 1909-1910; Northern Nigeria 1911-1913. Left Ilorin three days prior to this attack. Was constantly on the march. Housing during trek was bad.	No examination possible.
10. Recovery	Well-cleared station; only opened seven months. Altitude 3,000 feet. No swamps.	Nil	Culex and Anopheles. Very few Sand-flies.	Rainy season ...	Had five or six attacks of malaria lately. Spleen much enlarged for some years. A regular quinine taker.	12 years in West Africa, 2 years at St. Paul, 4 years Sierra Leone, 4 years Southern Nigeria, and the last two years in Northern Nigeria.	No parasites found.

11. Recovery	Park-like country. Cultivated land. Large grazing district.	4 cases since 1912	Anopheles, Culex, Stegomyia, Haematopota, Psychodidae.	End of rainy season.	Had malaria two months previous to this attack. Did not use a mosquito-net. A regular quinine taker.	Had completed nine months of third tour in Northern Nigeria. No previous tropical experience. Housing unsuitable to local conditions.	Small ring forms of malaria parasites found.
12. Recovery	Open veldt-like country. Swampy in places during rains.	1 case in 1913. (See 8.)	Mosquitoes and sandflies said to be numerous. Patient stated that he found ticks on his body every day as a result of walking through grass.	Damp mist prevalent in the district, which is also occasionally visited by severe blizzards. The nights are cold.	Patient states had mild attacks of fever twice a month, while for a month previous to his attack of blackwater he had malaria in a mild form nearly all the time.	Attack occurred in tenth month of first tour. No previous tropical experience. Was always on the move. Lived in a tent all the time.	No parasites found.
13. Recovery	Hilly country. No swamps. Very little bush.	Nil	Culex, Anopheles, Stegomyia, sandflies and Glossinae.	Rainy season	No previous illness. Was irregular with quinine until two months before this attack of blackwater.	Three years tour in Northern Nigeria. Served previously in Rhodesia and East Africa. Housing said to be of good native-built class.	No parasites found.
14. Recovery	Open bush country with scattered farms.	Nil	No information	Beginning of dry season. Rains had been unusually scanty this year.	Severe attack of blackwater in December, 1912, at Lokoja. Since then had been remarkably well. Took quinine daily.	Has been in Nigeria a good many years. Housing not suitable to local conditions.	No examination possible.
15. Death ...	Park-like undulating country. Well-wooded. Bush only partially cleared.	1 fatal case in 1910	<i>Stegomyia sagoensis</i> , <i>Nyssomyia</i> <i>pruinosus</i> , <i>Stomoxys nigra</i> , <i>oregia</i> and <i>calceolaris</i> , Tabanus, Hematopota. Ticks numerous.	Harmattan season. Very cold nights.	Had many slight attacks of malaria recently. Took quinine daily.	Had been in Northern Nigeria two years and four months. No previous tropical experience. Housing unsuitable to local conditions.	No parasites found.

SOUTHERN NIGERIA.

BLACKWATER FEVER REPORT FOR 1913.

Twenty-one cases of blackwater fever were notified in 1913. This number is a little smaller than that for the last year. Twenty-three cases were reported in 1912, and the average for the previous five years was thirty-five. This reduction, which is most marked for the larger towns, may be ascribed to the activities of the Sanitary Department both as regards their actual improvements and their influence on the individual. The total for 1913 is a small number to deal with statistically, and the following analysis is given for what it is worth. Nineteen cases occurred amongst Europeans, one in a West Indian negro, and one in a West African native.

One of the cases amongst Europeans (No. 16) is doubtful, for the illness closely resembled yellow fever.

Including this case, the disease ended fatally in five.

Sex.—Male Europeans far outnumber females in Southern Nigeria. Only one of the nineteen was a female.

Occupation.—Eleven of the patients were Government officials, five were merchants, two were missionaries, one was a mining engineer, one was captain of a merchant steamer, and the last was a native school-boy.

Four of the officials were in the Southern Nigeria Regiment, three lieutenants and a colour-sergeant.

Two were Medical Officers, two were District Commissioners, one was an engineer in the Public Works Department, one was a boiler-maker, and the tenth, the West Indian, was in the Agricultural Department.

The conditions are reversed from those of last year. The disease incidence then was highest in the mercantile community, now it is greatest amongst the officials. (Table I.)

As regards occupation, it will be observed that all the patients were required to travel through their districts, and to live for varying periods in a bush-hut, tent, or rest-house (cases 4, 15 and 20 are excepted). Put in another way, the patients had spent much of their time in places where the Sanitary Department have not yet been able to extend their energies in the way of clearing, drainage and town-planning.

Locality.—Eight cases occurred in the Eastern Province, eight in the Western, and five in the Central Province. Generally speaking, the physical features are the same for all three—mangrove swamp along the seaboard, dense forest in the central area, and grass land with large tracts of low bush in the north. The Central and Eastern Provinces have larger areas of low-lying swamp land and dense forest than the Western, and the Eastern Province possesses more dense humid forest than the Central.

Season.—The driest months are from October to March. Twelve cases occurred in this period. Four of these cases were in October and in the early part of November, just at the close of the rains.

The wet season extends from April to September. Nine cases took place during this period, four of them occurring in April, at the very beginning of the tornado season.

Mosquitoes and other biting flies may be said to be most numerous from May until September, and only four cases were recorded during this time.

The rainfall during 1913 was below the average. This happened too in 1912, so that the reduction in the number of cases in 1912 and 1913 may be attributable to the lessened rainfall.

Blackwater fever localities.—Blackwater fever, according to the records, appears to have occurred most frequently in Lagos, Warri, Sapele, Calabar, Ibadan, and Oshogbo. It must be remembered that these, with the exception of Oshogbo, are the largest towns in Southern Nigeria as regards both European and native population. They have all, in addition, a well-equipped hospital, and one or more Medical Officers are always in the station. Cases are brought into these places from the surrounding districts. Further, it is only natural that a "prospective" patient feeling "seedy" whilst travelling hastens in to the town, where he can receive prompt attention when necessary. Three cases, one a doubtful one, and another from a ship, occurred in Lagos or Ebute Metta during 1913. There were five cases in 1912, and an average of six to eleven each year since 1905.

One case was recorded from Sapele. Three occurred there in 1912, four in 1911, and one in 1910.

Two cases were notified from Warri. There were four in 1912, none in 1911, and one in 1910.

The West African negro lived in Ibadan, where there have been one or two cases in Europeans each year since 1907.

There has been one case in Oshogbo each year since 1909 (two in 1911).

With regard to the three Calabar cases, one had been resident also in Lagos, another was stationed at Uwet, and the third had been living in Forcados, Benin City, Warri, and Onitsha previously.

The patient from Oshogbo had also been resident in Itu and Ikom. The two Warri cases had been living one in Koko and the other in Sapele.

The Sapele case had also been in Warri.

The European patient from Ibadan had been trekking round the district.

It would appear, therefore, that there are no definite grounds for believing that blackwater fever clings to any one particular locality.

Age.—Most of the patients (nine) were between thirty and forty years, eight were in the third decade, three were over forty, and one was aged twelve years.

The age period thirty to forty years includes a larger number of Europeans, in Southern Nigeria, than any other, although the age period twenty to thirty years runs it closely. (Table II.)

Complexion.—Excluding the two negro patients, fifteen were described as "fair," three as "medium," and one "dark." The four deaths amongst Europeans included three of a fair complexion and one medium.

Antecedent malaria.—Only two patients stated that they had never suffered from malarial fever.

Previous attacks of blackwater fever.—Case 8 had suffered from one attack previously, and Case 12, the West Indian, had had two previous attacks. There was in Case 13 a history of eight or nine previous attacks of hæmoglobinuria, which all occurred in England. No further particulars are available for this case.

West African service.—Excluding the native boy and the case from the ship, one had served only nine months, one had served twelve months, four between one and a half and two years, one two and a half years, three had served three years, two four years, one five years, one six years, one seven years, two eight years, one eleven years, and one seventeen years. Thirteen of the cases occurred in those who had served five years or less. This is considerably more than half the total. Nine cases occurred in those who had served three years or less, which is more than one-third of the total cases.

Service in other tropical countries.—Three patients had served in India, one had been resident in South America, and one in South Africa.

Length of tour in which illness occurred.—One patient was attacked twelve days after his arrival. He was acutely ill and died in four days. Another case occurred after three months, three after six months, three after seven months, two after eight months, two after nine, one after ten, two after eleven, two after twelve, one after twenty-one months, and the last, the West Indian, after four years' continuous residence. Thus seventeen took place after six months' stay. (Table III.)

Habits as regards quinine prophylaxis.—Eight patients stated that they took five grains of quinine regularly. One of these took euquinine, and the others either the sulphate or the hydrochloride. Ten others admitted some irregularity, and two of these are interesting inasmuch as they are both Medical Officers. They had been extremely regular with the prophylactic, but owing to pressure of work in travelling round their districts they had omitted the drug for some three weeks before the blackwater fever attack.

One patient, the female, took only two grains per day, and this was measured roughly on the point of a penknife. Another patient took five grains regularly on alternate days, and the last, the West African, never took quinine at all.

The statement by the eight patients as to their taking five grains of quinine regularly has to be accepted in the broadest of spirits, but even so, the larger proportion of the cases were inefficiently protected from malaria by quinine.

Dosage of quinine immediately preceding the attack.—The dose was ten grains in eleven of the cases. It was the usual five-grain dose in other five. The dosage was large (about twenty-five grains) in two cases, and only two and a half grains in the case of the native boy and in Case 13, but in these two the drug had been

regularly administered in these doses for a day or two previously. It is definitely stated in one case (No. 3) that no quinine was taken before the attack.

Particular salt of quinine used.—This is stated in only three cases. The hydrochloride was used in two, and euquinine in one (a fatal case).

The deaths.—Curiously enough, four out of the five deaths occurred in those cases where five grains of quinine had been taken daily with regularity. All five had had frequent attacks of malarial fever. Only one patient had admitted irregularity with quinine taking.

One out of the two cases in which hæmoglobinuria had previously occurred died. It was the third attack in this case.

It has to be noted that three of the deaths took place in those of fair complexion, one in a patient of medium complexion, and the fifth in a negro.

As regards the length of service, two had six years' total residence, one had five years', one four years', one three, and one had one and half years' residence.

One patient contracted his fatal illness after twelve days of his tour, one after three months, one after six months, one after eleven months, and the last after four years' continuous residence in West Africa.

Three of the patients were aged 32 years, one 31, and one 37 years.

General signs and symptoms of the attack.—The premonitory symptoms, entirely absent in three cases, varied in intensity from merely a feeling of being "out of sorts" to violent general pains, headache, &c. Rigors are noted in fourteen cases. There was usually more than one rigor, and the usual duration was about thirty minutes. One patient complained only of "burning heat." Pains in the body, limbs, loins, stomach, &c., were observed in seven cases and were noted as severe in three.

In one case there was a sensation of tightness round the waist, which is possibly similar to the feeling expressed by another of the patients as a pressing desire to pass urine.

Vomiting occurred in fifteen cases, and was noted as troublesome, violent, or distressing in nine. It was bilious in four cases and "coffee-grounds" in one.

Three patients suffered from diarrhœa.

Restlessness, hiccup, persistent vomiting, delirium, "air-hunger," suppression of urine, great exhaustion and high fever characterised the severe and fatal cases.

Enlargement of the spleen was detected in five of the cases. Some degree of fever was observed in all the cases. Temperature charts are appended except for Case (No. 6) where no Medical Officer was in attendance and no records were made, No. 20 and No. 21.

Except in Case 9, where the temperature was never above 99·8° F., there was a considerable degree of pyrexia. All the charts show a well-marked remission, which amounts to a definite intermission in some, during the first few days. The tracings show a considerable range of variation, quick falls and rapid rises being prominent. The high fever as a rule terminates abruptly, but a low fever continues for several days thereafter in most of the cases. This later fever may be due to malaria (Case No. 2) or to absorption of toxins resulting from the hæmolysis. As regards the actual illness, the cases appear to fall naturally into groups.

The first group includes the mild cases where hæmoglobinuria and a rise of temperature are the only obvious features. In the second group there is more general disturbance, with rigors and vomiting, but the attack follows a mild course. The third group includes cases where there is severe systemic disturbance, violent pains, distressing vomiting, anxiety and restlessness, &c.

Cases 7, 8, 9, 14, 17 and 20 fall into Group I., Cases 4, 5, 10, 11, 13, 15 and 18 into Group II., and Cases 1, 2, 3, 6, 12, 16, 19 and 21 fall into Group III.

Average duration of hæmoglobinuria.—This in round figures was just under 48 hours. The shortest period was three hours and the longest eleven days (in the last, Case 15, however, there was hæmaturia).

One illness of eleven days duration, two of nine days, two of seven and one of six days bring up the average, whilst the duration in the remaining twelve cases was five days and under. The fatal cases showed hæmoglobinuria lasting 11 days, seven days, four days, four days, and two days.

Hour of onset.—The hour is stated in nineteen cases. It was between 6 a.m. and 6 p.m. in fourteen. Eight occurred in the afternoon between 1.30 p.m. and 6 p.m.

NORTHERN NIGERIA

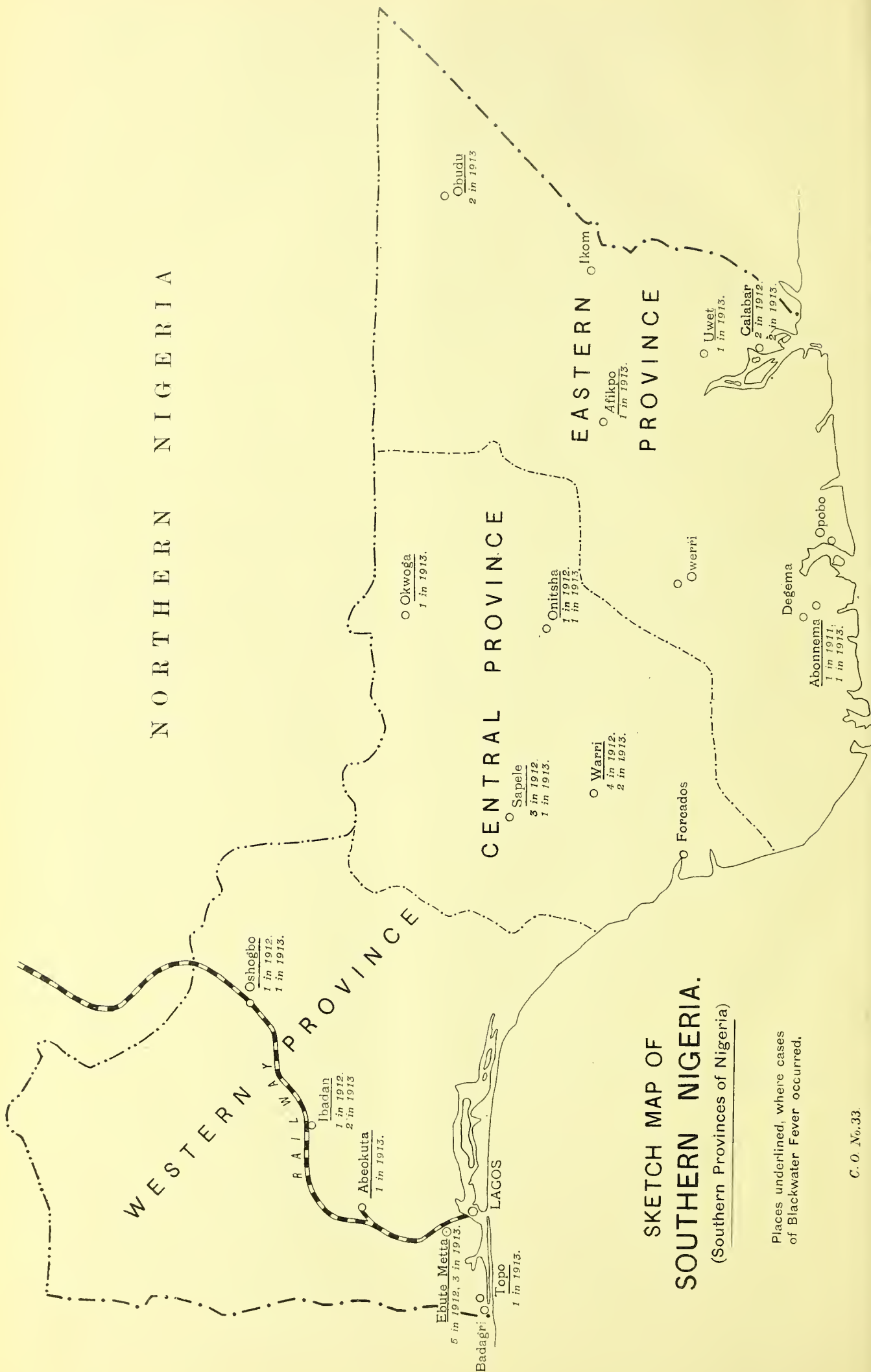
WESTERN PROVINCE

CENTRAL PROVINCE

EASTERN PROVINCE

SKETCH MAP OF SOUTHERN NIGERIA.

(Southern Provinces of Nigeria)



Places underlined, where cases of Blackwater Fever occurred.

Remissions and relapses.—Only three cases showed relapses. These occurred in one on the sixth day, in another on the second and again on the sixth day, in the third on the tenth day. This last case also showed a remission on the fifth day, whilst a fourth case showed remissions on the second and again on the third day.

Onset of jaundice.—Jaundice appeared on the first day of the hæmoglobinuria in ten cases, on the second day in five, on the third day in two, on the fourth day in one (the West African native), and on the sixth day in Case 16 (already commented on). Jaundice was not observed in one case.

The tint as a rule was lemon-yellow, and in one case was described as deep saffron. As a rule the colouration affected the entire body surface, but in a few cases it was only observed in the conjunctivæ.

Parasites found at blood examination.—Subtertian malaria rings were found in five cases. They were detected at the time of onset of the hæmoglobinuria in one case, two days before the attack in two cases, on the day before the attack in one case, and on the sixth day of illness in the fifth.

No blood examination was made in one case (No. 6), no record is made in another, and the findings were negative in the remaining fourteen.

No attempt has been made to collect statistics regarding the incidence of malarial fever for comparison with the number of cases of hæmoglobinuria. There are several reasons why such figures would be entirely valueless. Not every European reports his illnesses officially, and not every native seeks medical treatment when he has fever. Further, many cases are reported as "Fever," "Continued Fever," "Malarial Fever," in which no blood examination has been made, on account of the lack of the necessary appliances.

Major Beverley, Intelligence Officer, has supplied the figures for the population. The map was also prepared by him and has been copied and filled in by Sergeant Phipps, R.A.M.C. Mr. A. Cleminson, Deputy Director of Surveys, supplied the rainfall statistics for the year.

A. CONNAL,
Director,
Medical Research Institute.

Yaba.

30th May, 1914.

SYNOPSIS OF CASES OF BLACKWATER FEVER, SOUTHERN NIGERIA, 1913.

Western Province :—

Abeokuta	...	...	...	...	...	1
Badagry (Topo)	...	...	...	...	...	1
Ibadan	...	...	...	...	...	2
Lagos (and Ebute Metta)	...	...	...	...	...	3
Oshogbo	...	...	...	...	...	1
					—	8

Central Province :—

Okwoga	...	...	...	...	...	1
Onitsha	...	...	...	...	...	1
Sapele	...	...	...	...	...	1
Warri	...	...	...	...	...	2
					—	5

Eastern Province :—

Abonnema	...	...	...	...	...	1
Afikpo	...	...	...	...	...	1
Calabar	...	...	...	...	...	3
Eket (Qua Ibo district)	...	...	...	...	...	1
Obudu	...	...	...	...	...	2
					—	8

Total	...	...	...	...	...	21
					—	—

CHART

Showing monthly rainfall and cases of Blackwater Fever.

The rainfall figures are the combined totals from all the Stations in which cases of Blackwater Fever occurred.

Continuous line — rainfall in inches.

Dotted line number of cases of Blackwater Fever.

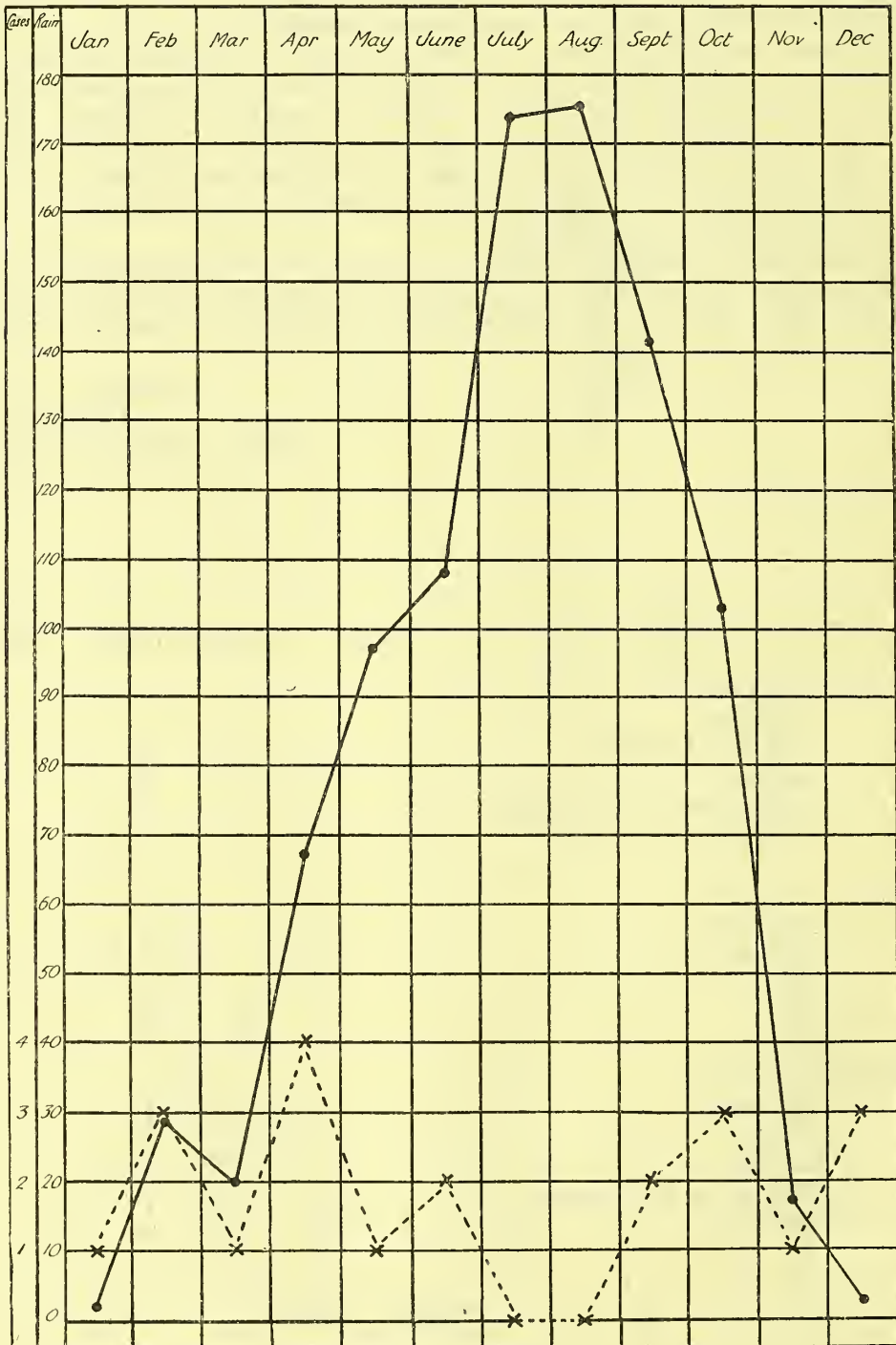


TABLE I.

Occupation.	Cases.	Census 1911.	Per cent.
Government Officials	11	630	1·74
Merchants, &c.	7	798	0·87
Missionaries	2	191	1·04
Native	1	—	—

TABLE II.

Age.	Cases.	Deaths.
Under 30 years	9	0
30-40 years	9	5
Over 40 years	3	0
	21	5

TABLE III.

Length of Tour.	Cases.	Deaths.
Under 6 months	2	2
6-12 months	13	2
Over 12 months	5, one native	1
	20	5
Omitting the case from the ship		

APPROXIMATE POPULATION.

Place.	European.*	Native †	West Indian.
Abeokuta	60	51,000	Brazilians and West Indians in the S. Provinces — 400 ; the latter equal about 17 of the former. There are about 10 West Indians in Abeo- kuta.
Afikpo	10	15,500	
Badagri	20	7,000	
Calabar	150	14,000	
Degema and Abonema**	25	4,000	
Ibadan	80	175,000	
Lagos†*	550	72,500	
Obudu	5	2,000	
Okwoga	5	4,000	
Onitsha	60	12,000	
Oshogbo	10	60,000	
Sapele	30	2,000	
Warri	60	2,500	

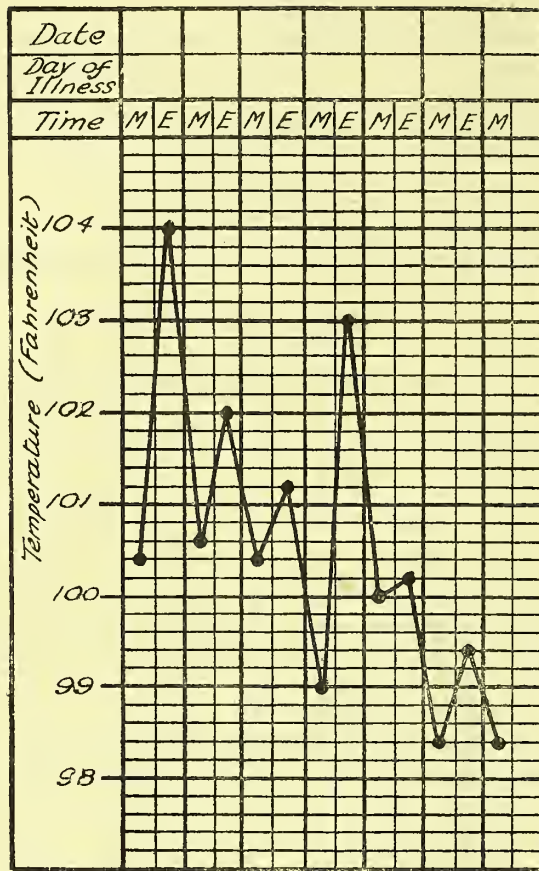
* Average number.

† Natives of West Africa.

** Degema and Abonema together form practically one place.

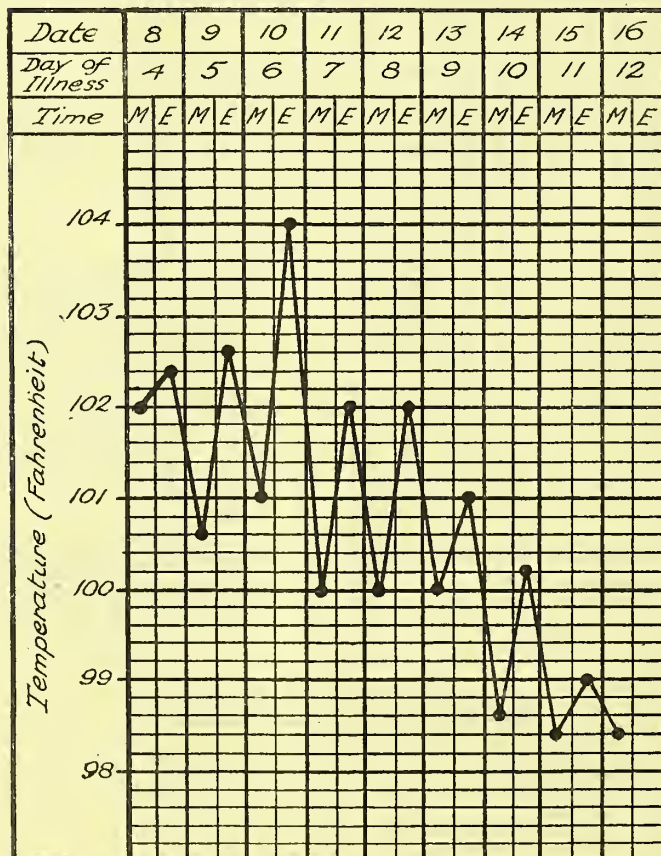
†* Municipal area.

Case 1.



Case 2.

Feb. 1913.



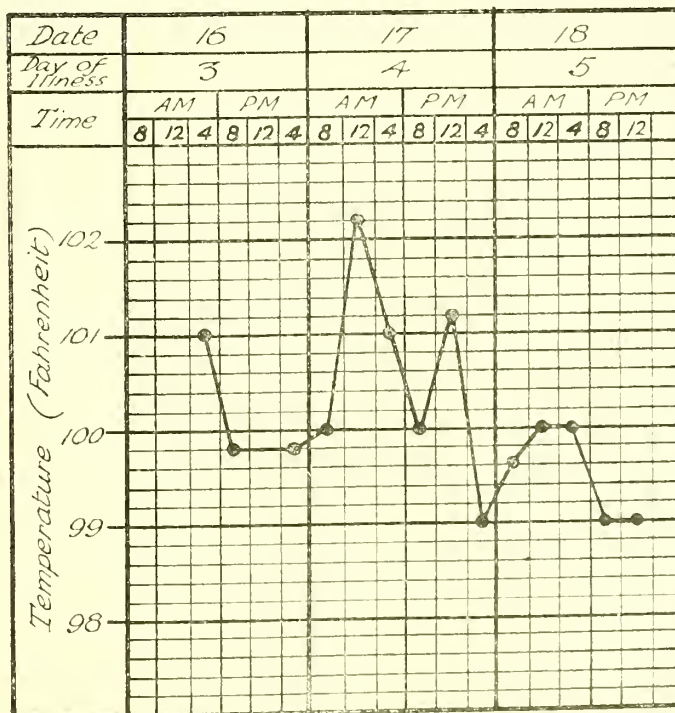
Case 3.

Month: February 1913



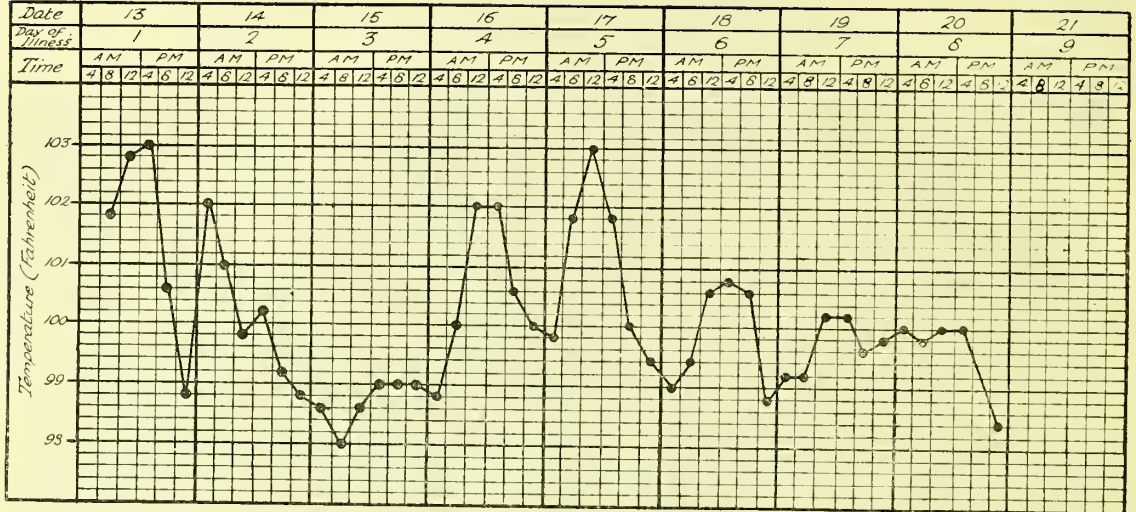
Case 4.

Feb. 1913



Case 5.

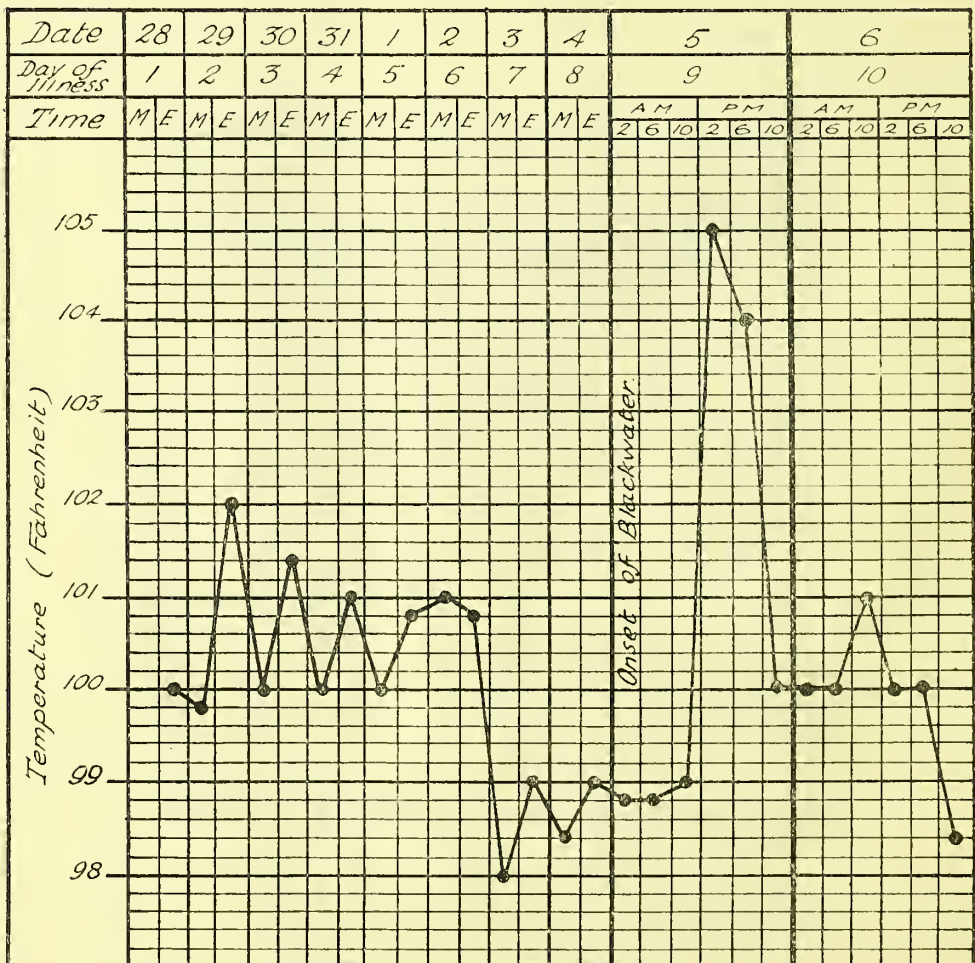
March 1913.



Case 7.

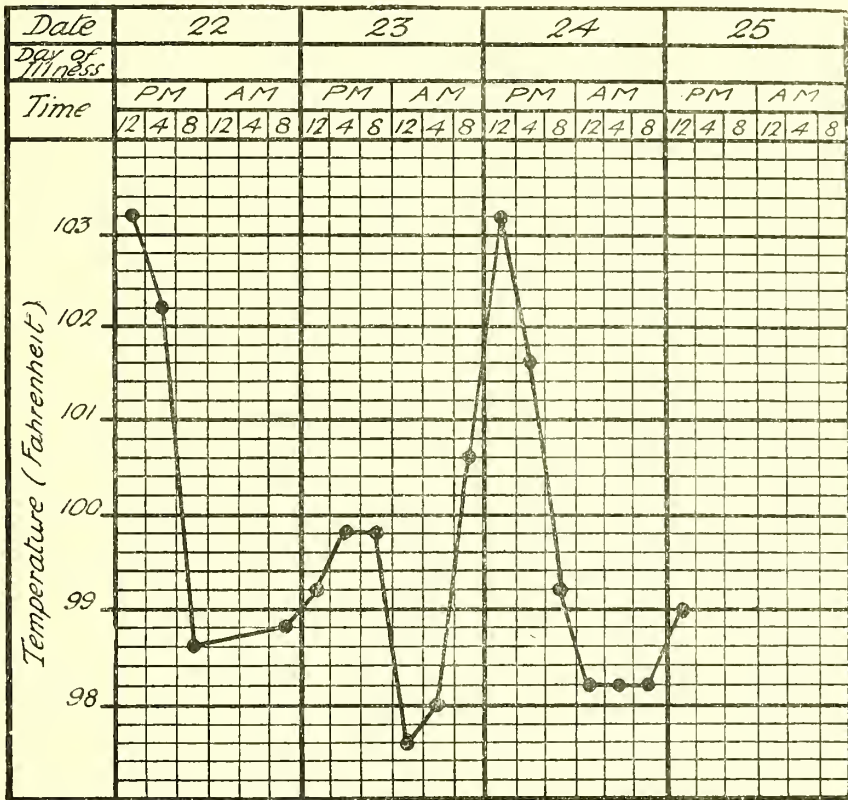
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April



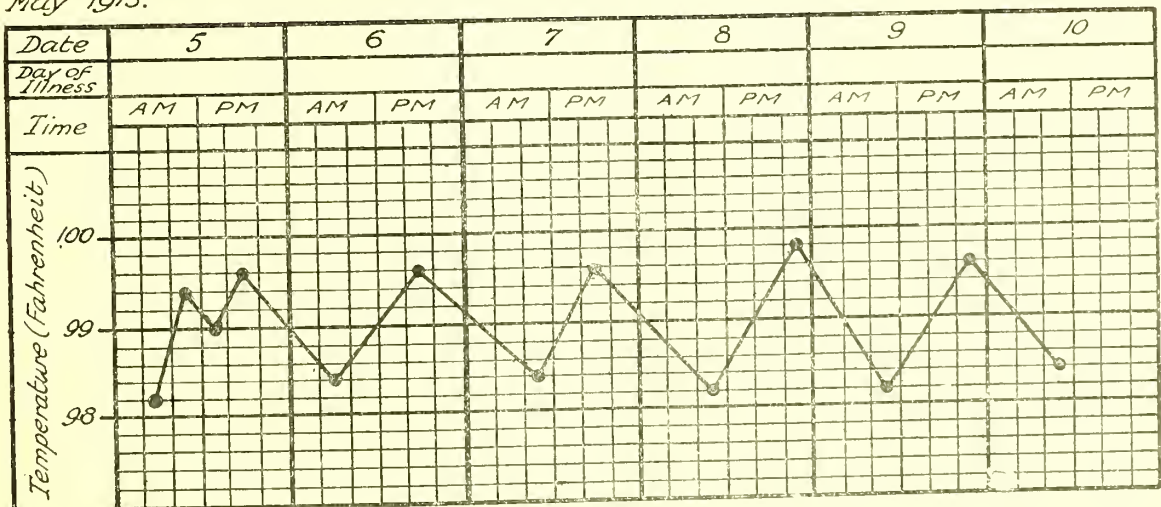
Case 8.

April 1913



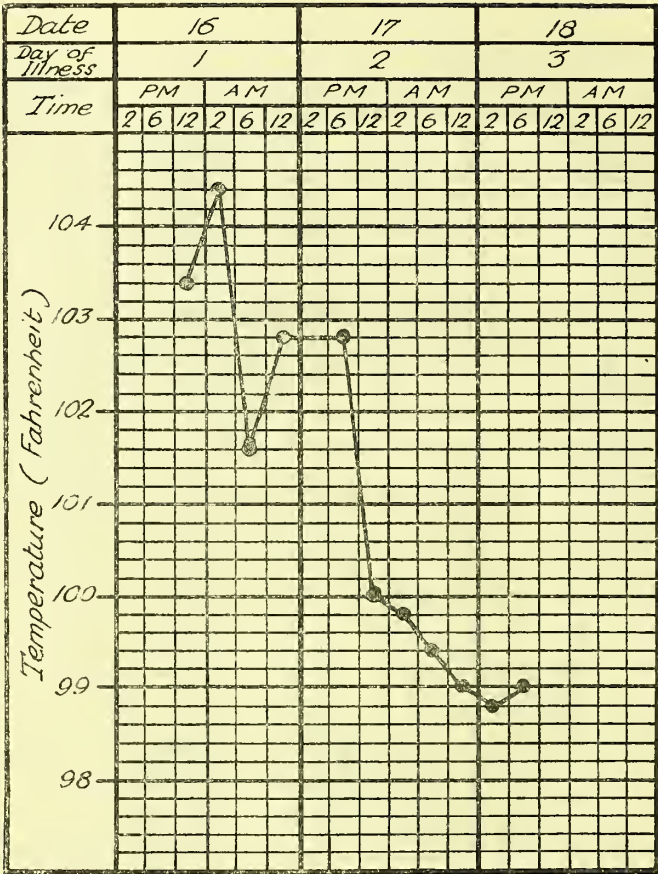
Case 9.

May 1913.



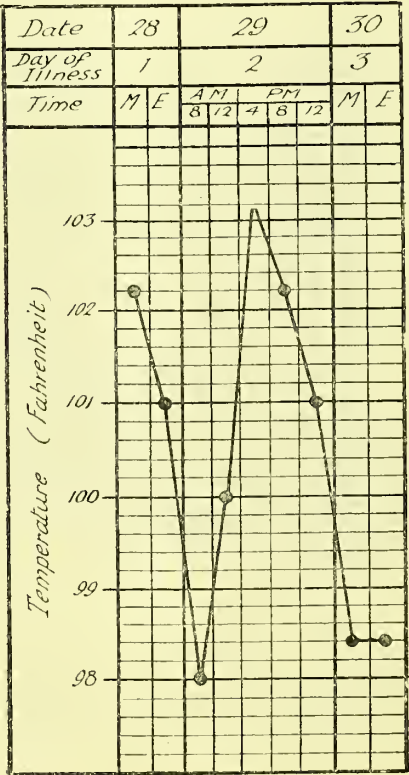
Case 10.

May, 1913.



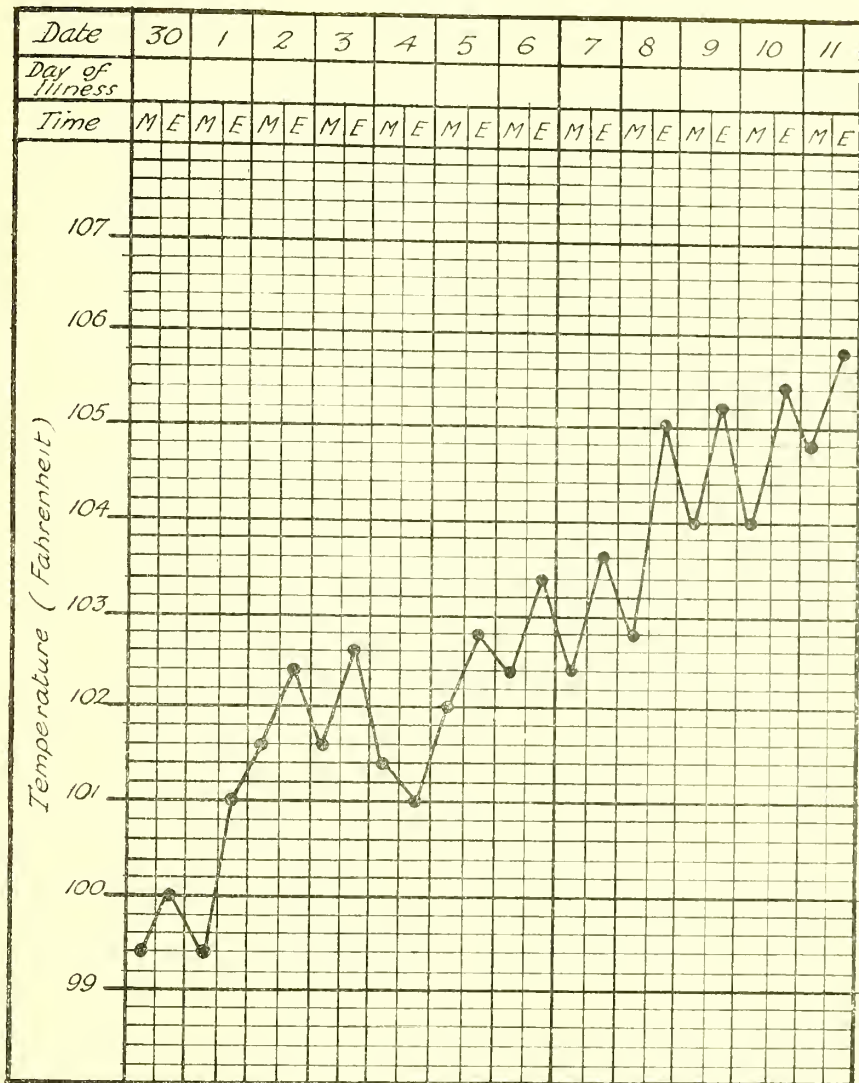
Case 11.

June 1913.



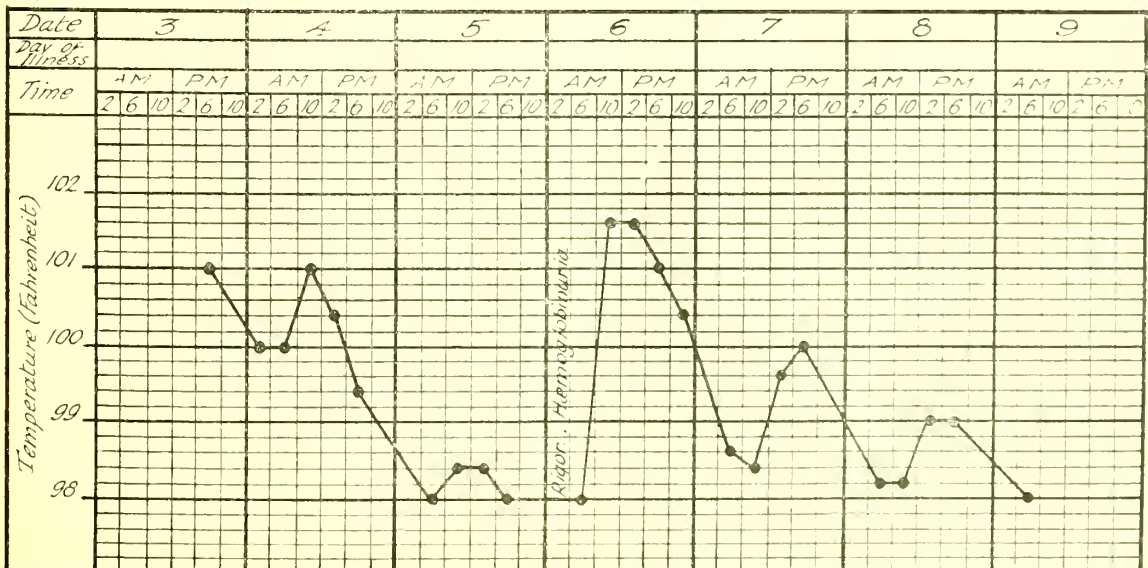
Case 12.

June 1913 July



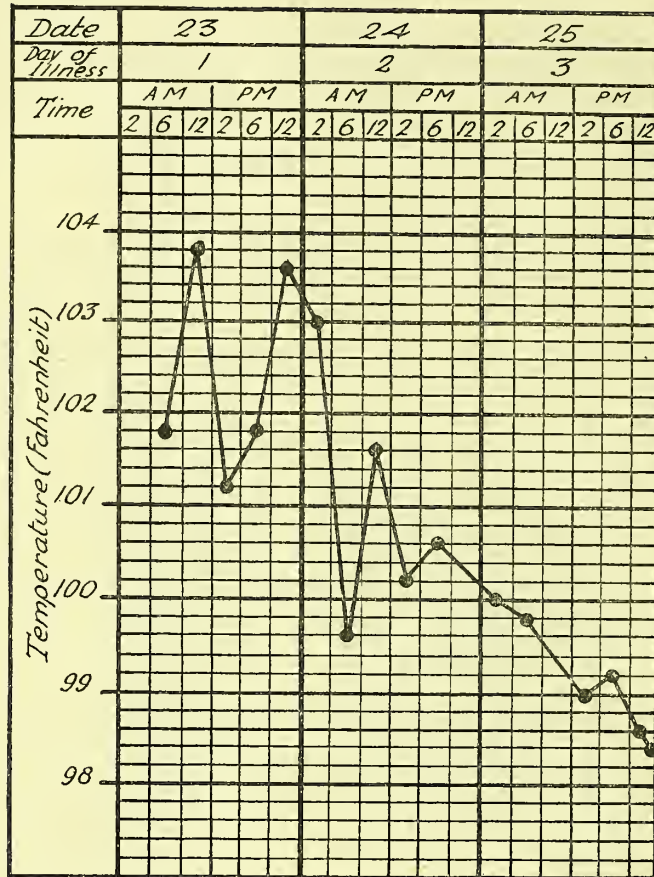
Case 13.

Sept. 1913



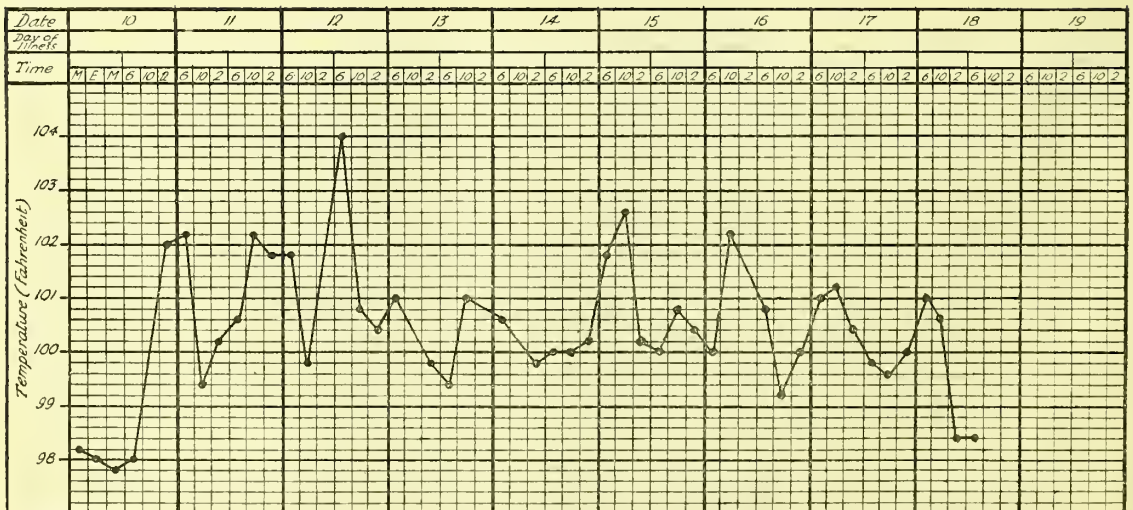
Case 14.

Sept 1913.



Case 15.

Oct 1913



Case 16.

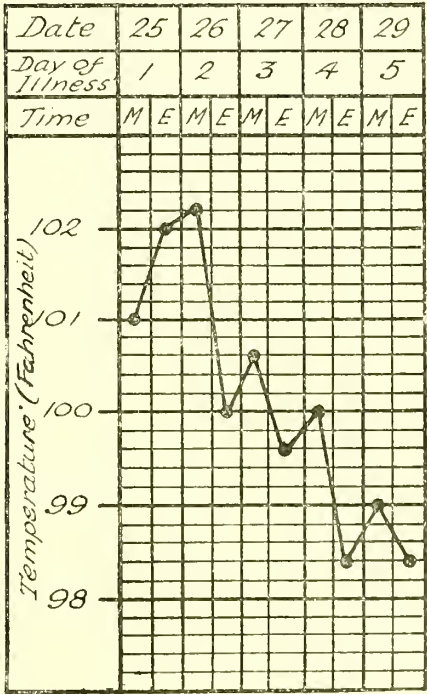
Oct. 1912

Nov



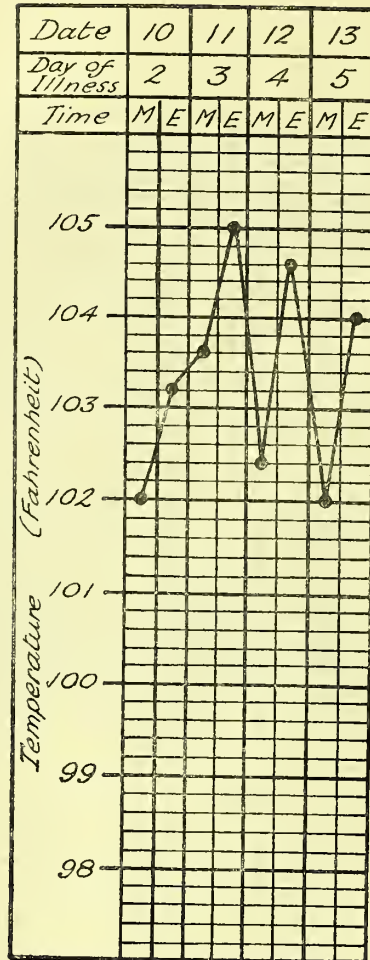
Case 17.

Oct 1913.



Case 18.

Nov. 1913.



Case 19.

Dec. 1913.

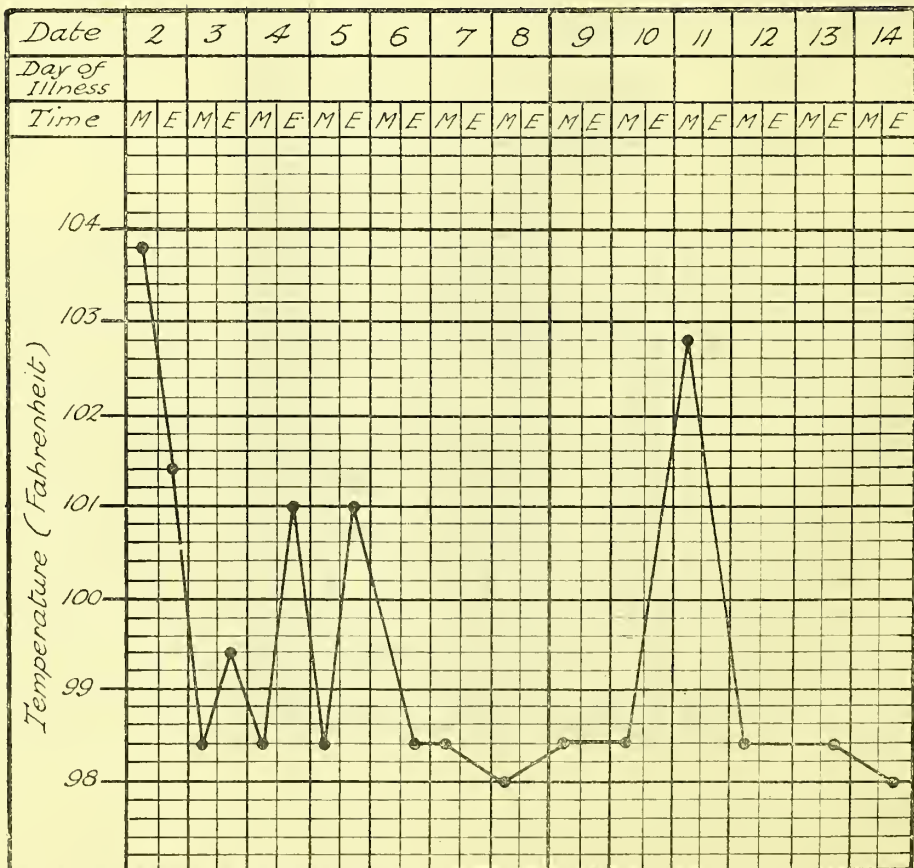


TABLE IV.

No.	Description and Date.	Locality.		Seasonal Variations and Climatic Conditions.	Personal History.			Blackwater Fever.						
		Station, Quarters, and Physical Features.	Cases in same place.		Insect Fauna.	Service and General Habits.	Previous Illnesses, etc.	Previous attacks of Blackwater Fever.	Quinine prophylaxis and dose taken just before attack.	Hour of onset and time of onset of jaundice.	Signs and Symptoms.	Duration of Haemoglobinuria.	Duration of Albuminuria.	Blood Examination.	Duration of Illness and Result.
1	Male. Age 26. British Eyes greyish blue, hair red, complexion fair. Merchant. January 16.	Abomnema. Corrugated iron building on banks of Sombreiro River, surrounded by native town; low-lying and swampy. Creeks subject to ebb and flow of river.	1 in 1911 1 in 1913	Anopheles, Culex, Ochlerotatus, Mucicus, Stegomyia, Taniorrhynchus, Tabanus, Chrysops, Glossina, Stomoxys,	West Africa 3 years. Present tour 7½ months. Temperate.	Scarlet Fever in 1900.	None	5 grains irregularly. 10 grains.	11 a.m. 2nd day.	Pains all over body followed in twenty-four hours by the passage of typical "black water" of the colour of stout. Three severe rigors each lasting 20 to 40 minutes on first two days of illness. Distressing retching and bilious vomiting for four days. Deep saffron-yellow colour of skin and conjunctive. Pulse 80 to 110, small, regular and compressible. Spleen 4" below costal margin and very tender. Pains in back and loins. Dr. O'DEA.	9 days	11 days.	Negative	13 days; recovery.
2	Female. Age 24. French Eyes blue-grey, Hair dark brown, complexion sallow. Missionary. February 5.	Topo. Old wooden house on sea beach, eight feet from ground Numbers of native girls living in close proximity. Low-lying, swampy.	1 in 1913	Glossina, Tabanus, Stomoxys, Stegomyia, Culex, Culicomyia, Myzomyia, Nyzorhynchus, Xenopsylla.	West Africa 1 year. Present tour 1 year. Abstemious.	Many slight attacks of malaria.	None	2 grains daily. 8-10 grains.	4 p.m. 2nd day.	Had been feeling ill for two or three days but did not go to bed. On morning of 5th February, 1913, she took an "extra dose" of quinine (about 10 grains). Black water commenced at 4 p.m. same day. There was a severe rigor just previously, lasting about 30 minutes. Vomiting was troublesome, pains in back not severe. "Black water" was passed many times, 8-10 ozs. throughout the following day. Fourth day (when first seen) she was very exhausted, in a clammy perspiration, anemia profound. Complained of extreme weakness and want of sleep. Temperature 102° F., pulse 124, very feeble. Vomiting after all food. Soft systolic bruit over mitral area, and rough systolic bruit over pulmonary valve. Slight trace of jaundice in sclere. Spleen palpable at costal margin. Dr. BOOTH.	2 days	4 days	Subtertian parasites on sixth day.	11 days; recovery.

No.	Description and Date.	Locality.		Personal History.				Blackwater Fever.							
		Station, Quarters, and Physical Features.	Cases in same place.	Insect Fauna.	Seasonal Variations and Climatic Conditions.	Service and General Habits.	Previous Illnesses, Malaria, etc.	Pre-vious attacks of Black-water Fever.	Quinine prophylaxis and dose taken just before attack.	Hour of onset and time of onset of jaundice.	Signs and Symptoms.	Dura- tion of Hæmo- glob- inuria.	Dura- tion of Albu- min- uria.	Blood Ex- amin- ation.	Duration of Illness and Result.
3	Male. Age 33. British. Eyes blue, hair light, complexion fair. Merchant. February 13.	Calabar. Good quarters, hilly country, densely covered with forest and much intersected by creeks.	2 in 1905 8 in 1906 5 in 1907 3 in 1908 2 in 1912 3 in 1913	Glossina, Tabanus, Chrysops, Myzomyia, Culex, Culicomyia, Ochlerotatus, Hodgesia.	Dry season. Feb. rainfall 2.71", year's rainfall 128.84", average rain-fall 131.08", mean max. temp. 94° F., mean min. temp. 72° F.	West Africa 11 years. Present tour 9 months. Temperate.	Several slight attacks of fever during three months previous.	None	Took quinine only when feverish. None.	4 a.m. 1st day.	Rigors marked during first two days. Urine dark-coloured with brown deposit. No pain and only vomited slightly on 2nd day. Took fluids well. Urine started to clear on afternoon of 13th February, 1913, and was clear next morning. He went on well until afternoon of 18th February, 1913, when he had a rigor, temperature 104° F., and urine became black again. On 19th February, 1913, he had a bad day with several rigors and temperature rose to 106° F. He was very exhausted but had no pain. On 20th February, 1913, urine cleared and he made good progress. Jaundice was present on first day. DR. CRAIG.	1st attack 4 days. 2nd attack 3 days.	9 days	Negative	11 days; recovery.
4	Male. Age 12. West African schoolboy. February 14.	Ibadan. Native-built house on European plan. A rolling plateau with low hills and hardly any virgin land.	1 case or more each year since 1907. 1 case in 1912. 2 in 1913.	Glossina, Hæmatopota, Tabanus, Culicoides, Myzomyia, Culicomyia, &c.	Dry season. Feb. rain-fall 0.85". Yearly rain-fall 49.19". Average rain-fall 49.87". Mean max. temp. 86° F. Mean min. temp. 58.5° F.	West Africa since birth.	Frequent attacks of malaria.	None	None. 2½ grains thrice daily from day previous to attack.	Un-known. 4th day.	Headache. Pain between shoulders and in back. Temp. 101° F., pulse rapid and thready. Skin moist, tongue pink and slightly furred. Vomited on evening of 16th February, 1913, and again next day, vomited matter being yellow. Also vomited around-worm. Spleen enlarged to umbilicus. Urine continued dark in colour until morning of 18th February, 1913, and was passed in small quantities. DR. BEALE-BROWNE.	9 days.	13 days.	Negative	13 days. Recovery.
5	Male. Age 28. British. Eyes brown, hair brown, complexion medium. Lieut. S.N.R. March 13.	Ibadan. Some time in bush hut, latterly in mess bungalow. Was travelling for a week previous to illness.	See above	See above	End of dry season. March rain-fall nil.	West Africa 9 months. Had served in India. Present tour 9 months.	Diphtheria, 1910.	None	5 grains daily. 5 grains.	10 a.m. 1st day.	Was awakened at 3 a.m. 13th March, 1913, with violent pains in loins, back and abdomen; relieved by hot-water bottle. Was seen at 7 a.m. and asked as to urine; some had been passed but colour un-noticed. Again passed urine at 10 a.m., nearly black in colour. Began to clear on 15th March, 1913, but darkened again same day, and cleared again on 16th March, 1913. Again became dark on 18th March, 1913, but cleared on same day. DR. BEALE-BROWNE.	6 days.	6 days.	Negative	7 days. Recovery.

DR. CRAIG.

DR. BEALE-BROWNE.

DR. BEALE-BROWNE.

6	Male. Age 32. British. Eyes blue, hair dark brown, complexion fair. Missionary. April 4.	Various mission stations on Qua Ibo River. Bush huts and bungalows. Low- lying and swampy.	No record except in 1912, when 2 cases occurred. 1 case in 1913.	Glossina, Tabanus. Chrysops.	Beginning of rainy season. No statistics available.	West Africa 4 years. Present tour 3 months. Abstemious.	Neuritis in 1906. Several slight attacks of malaria in present tour.	None	5 grains daily. 5 grains.	6 p.m. 1st day.	There was no medical officer in attendance. At 6 p.m. on 4th April, 1913, he had a rigor and high fever. At 7 p.m. a large amount of very dark urine was passed. Vomiting began with the fever and continued all through the attack. At about noon on 5th April, 1913, suppression of urine occurred. On two occasions during the following week a small quan- tity of clear urine was passed. There was no fever after 5th April, 1913, and little restlessness, but there was constant vomiting and much weakness until death at 3 a.m. 12th April, 1913. Dr. FORAN.	2 days.	Un- cer- tain.	None	8 days. Death.
7	Male. Age 27. British. Eyes blue, hair light, com- plexion fair. Merchant. April 5.	Warri. Good bungalow, not mosquito- proof. Low-lying and swampy.	One case in 1906. 1 in 1909, 1 in 1910, 4 in 1912, 2 in 1913.	Glossina, Tabanus.	Beginning of wet season. April rainfall 6-10" Year's rainfall 112-74". Average rain- fall 107-24". Mean max. temp. 92° F. Mean min. temp. 74° F.	West Africa 21 months. Present tour 21 months. Moderate.	For first year no malaria, 3 attacks in next 6 months and fever every 14 days in last 3 months.	None	5 grains daily ? 10 grains.	2 p.m. 1st day.	Had been in hospital for eight days with malaria. He had 30 grains quinine hydrochloride daily for four days, and 20 grains daily thereafter. At 1 p.m. on eighth day, after a light lunch, complained of "feeling rotten." At 2 p.m. temp. was 105° F. No rigor, no pain, only a burning heat. At 3.30 p.m. passed port-wine coloured urine. 6 p.m., temp. 104° F.; 10 p.m., temp. 100° F. Next day felt fairly normal; urine clear, but albuminous. No tenderness nor enlargement of liver or spleen. Dr. ASHTON.	28 hours.	60 hours	Not examined.	6 days. Recovery.
8	Male. Age 46. British Eyes blue, hair brown, com- plexion fair. Medical officer. April 22.	Onitsha. Good house, mosquito-proof. Hilly and open country, with patches of forest. 200 feet above River Niger.	One or more cases each year since 1907 none in 1911, 1 in 1912, 1 in 1913.	Glossina, Tabanus, Culex, Mansonioides, Myzomyia, Taniorrhynchus, Phlebotomus, Ctenocephalus, Rhhipicephalus, &c.	Wet season. April rainfall 8-39". Year's rainfall 65-74". Average rain- fall 71-30". Mean max. temp. 92° F. Mean min. temp. 74° F.	West Africa 17 years. Present tour 7 months. Abstemious.	One attack of malaria in 1904, and one attack 3 weeks after first attack of blackwater fever. Numerous slight "bilious attacks."	One, 8 years ago.	5 grains daily, but had been neglected for 3 weeks. Large dose, probably 25 grains.	3 a.m. 3rd day	Slight fever and vomiting, and pass- ing "black water." Dr. ELLIS.	4 days.	11 days.	Negative	11 days. Recovery.

No.	Description and Date.	Locality.		Seasonal Variations and Climatic Conditions.	Personal History.				Blackwater Fever.						
		Station, Quarters, and Physical Features.	Cases in same place.		Insect Fauna.	Service and General Habits.	Previous Illnesses, Malaria, &c.	Pre-vious attacks of Black-water Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of onset and time of onset of jaundice.	Signs and Symptoms.	Dura- tion of Hæmo- glob- in- uria.	Dura- tion of Albu- min- uria.	Blood Ex- amina- tion.	Duration of Illness and Result.
9	Male. Age 46. British. Eyes blue, hair brown, complexion fair. Mining engineer. April 25.	Uwet (Calabar). Bush camp. See No. 3.	See No. 3	Wet season. April rainfall 8.19". See No. 3.	See No. 3	West Africa 18 months. Present tour 10 months. Served in South America. Temperate.	Frequent attacks of malaria in last 4 months.	None	Irregular 10 grains.	4 p.m. 2nd day.	Felt unwell all day. Had rigor about 2 p.m. Passed black urine about 4 p.m. Was seen by medical officer on afternoon of 26th April, 1913, when urine was clearing. Temp. was 99° F. There had been no vomiting. Except for a temp. of 99.5° F. in the evening of 26th April, 1913, he felt well during the whole attack. Dr. CRAIG.	1 day.	2 days.	Negative (not examined until third day).	12 days. Recovery.
10	Male. Age 36. British. Eyes grey, hair dark, complexion d'rk. Medical Officer. May 16.	Afikpo. Unfurni-bed house on a hill. Dense forest on one side of Cross River, open grass country on other side.	1 case in 1909, 1 case in 1910.	Wet season. May rainfall 1.65". Year's rainfall 56.08".	Anophelines, Culicines, Glossina, Tabanus, Culicoides.	West Africa 8 years. Present tour 8½ months. Temperate.	Several attacks of malaria in last 3 months, but few attacks previously.	None	5 grains daily, but had been taken quite irregularly during last 3 months. 10 grains.	1.30 a.m. (Jaundice present one week before the attack, but increased on 1st day of illness.)	Rigors at intervals from 10 p.m. 15th May, 1913. Violent vomiting at 1.20 a.m. 16th May, 1913, and after that a pressing desire to pass urine, which proved to be black-coloured. Before morning about 30 ounces urine were passed. Came to Calabar from Idu in a launch, and on arrival vomiting and restlessness were marked, but there were no other untoward symptoms. Dr. CRAIG.	2 days.	8 days.	Negative (on second day).	10 days. Recovery
11	Male. Age 36. British. Eyes brown, hair grey, complexion sallow. District Commissioner. June 29.	Oshogbo. Satisfactory house. Well-watered, undulating country. No swamps.	1 case in 1909, 1 in 1910, 2 in 1911, 1 in 1912, 1 in 1913.	Wet Season. June rainfall 7.80". Year's rainfall 44.53". Average rainfall 50.01". Mean max. temp. 92° F. Mean min. temp. 68° F.	Simulium, Glossina, Stomoxys, Tabanus, Chrysops, Hippocentrum, Hamatopota, Myzomyia, Nyzorhynchus, Culex, Mansonoides, Culicomyia, Stegomyia, Ctenocephalus, Boophilus.	West Africa 7 years. Present tour 11½ months. Moderate.	Occasional gastritis. Three previous attacks of malaria.	None	5 grains daily. 10 grains.	4 p.m. 1st day.	28th June, 1913. Six loose motions, bright yellow. Vomited yellow-stained fluid twice. Temp. 102° F., fell to 101° F. 29th June, 1913. Morning temp. 98° F. At 11 a.m. a rigor lasting 45 minutes; temp. 103.2° F. at 4 p.m. and 8 ozs. porter-coloured urine passed. At 6 p.m. 4 ozs. urine not so dark. At 11 p.m. urine clear. Dr. BRIERLEY.	3 hours.	1 day.	Negative	3 days. Recovery.
12	Male. Age 32. W. Indian. Eyes	Abeokuta. Mud-walled house. Numerous mos-	—	Wet season. June rainfall 6.20".	Hamatopota, Chrysops, Simulium,	West Africa 6 years. Present tour	Frequent attacks of malaria.	Two previous	Very irregular. 10 grains.	2.30 p.m. 3rd day.	Shivering at onset. Pain in legs and back. Headache, fever, vomiting, hiccough, jaundice. Tongue dry,	7 days.	12 days.	Negative 2nd, 3rd, 4th, 5th,	12 days. Death.

13	brown, hair black. Agri- culturist. June 30.	quitoes. Hilly. near Ogun River.	Stomoxys, Hippobosca, Tabanus, Glossina, Phlebotomus, Culicoides, Anopheles, Culex, Stegomyia, Mansonioides.	Year's rainfall 44.49". Average rain- fall 47.16".	4 years. Native of Barbados. Temperate.	at- tacks.	None on present tour. 2½ grains.	9 a.m. 1st day.	Admitted to hospital with malarial fever on 3rd September, 1913. Quinine, 2½ grains, given at 7 a.m. on 6th September, 1913, and rigor at 9 a.m. followed by hæmoglo- binuria which lasted 12 hours. There was marked jaundice. DR. LEONARD.	12 hours.	3 days.	Before attack numerous subtertian parasites	10 days. Recovery.	
14	Male. Age 38. British. Eyes blue, hair fair, com- plexion light. Merchant. Sept. 6.	Lagos. House in native town. Low lying. On lagoon.	Glossina. Tabanus, Haematopota, Chrysops, Culicoides, Culex, Culicomyia, Ochlerotatus, Anopheles, Stegomyia, Xenopsylla.	Wet season. Sept. rainfall 3.32". Year's rainfall 63.07". Average rain- fall 74.65". Mean max. temp. 89° F. Mean min. temp. 77° F.	West Africa 2½ years. Present tour 6 months. Temperate.	Frequent attacks of malaria.	Hæ- mo- glo- binuria 8 or 9 times in Eng- land.	5 grains on alternate days. 10 grains.	5 a.m. 1st day.	On the night of 22nd September, 1913, he did not feel well, and had some looseness of the bowels. To get rid of it he took 10 grains quinine and went early to bed. When seen in morning was at breakfast, and had passed a large quantity of dark urine, but felt quite well. For a day or two before the attack he had looked slightly jaundiced. On admission to hospital he had a sense of tightness round the abdomen and felt cold. A little later in the day he had two rigors. Urine cleared on 25th September, 1913. DR. ADAM.	48 hours.	3 days.	Negative	4 days. Recovery.
15	Male. Age 28. British. Eyes grey, hair brown, fair complexion. District Commissioner. October 11.	Warri. Government quarters. See No. 7.	See No. 7	End of wet season. October rain- fall, 10.83". See No. 7.	West Africa 4 years. Present tour 12 months. Temperate.	Light previous attacks of malaria. May fever.	None	5 grains daily. 5 grains.	2 p.m. None.	Usual rigor, vomiting and black urine. DR. THOMPSON.	2 days.	12 days.	Negative	12 days. Recovery.

No.	Description and Date.	Locality.		Seasonal Variations and Climatic Conditions.	Personal History.				Blackwater Fever.						
		Station, Quarters, and Physical Features.	Cases in same place.		Insect Fauna.	Service and General Habits.	Previous Illnesses, Malaria, etc.	Pre-vious attacks of Black-water Fever.	Quinine Prophylaxis and dose taken just before attack.	Hour of onset and time of onset of jaundice.	Signs and Symptoms.	Dura- tion of Hæmo- glob- inuria.	Dura- tion of Abnor- mal- uria.	Blood Ex- amin- ation.	Duration of Illness and Result.
16	Male. Age 31. British. Eyes blue, hair brown, fair complexion. Boilermaker. October 25.	Ebute Metta. Government quarters. Low-lying and swampy.	Six to eleven cases in Lagos each year since 1905, 5 in 1912, 1 in 1913.	End of wet season. Oct. rainfall 6.31". year's rainfall 63.07". average rainfall 74.65". Mean max. temp. 89° F., mean min. temp. 77°.	Glossina, Tabanus, Hæmatopota, Hippocentrum, Culicoides, Psychodidae, Stegomyia, Culicines, Anophelines, Xenopsylla.	West Africa 1 year. Present tour 6 months. Temperate.	Malaria six weeks previously.	None	5 grains daily. 5 grains.	11.30 a.m. 6th day	Was at work all morning until 11.30 a.m. Then felt cold and shivery and had rigors, vomiting, and fever. Passed few drops bloody urine. Great distress, frequent vomiting, skin hot and dry, conjunctivæ injected, frontal headache, loin pains. Temperature 102.4° F., pulse 120. Tongue furred, gums swollen and bleeding, epigastralgia. Later, bleeding from gums increased; vomited matter contained black débris. Urine passed rarely and in small amount, and contained red cells and casts. Vomiting persisted, hæmatemesis, mæna and hæmaturia continued, patient grew weaker, pyrexia fell, and subnormal temperatures the rule, pulse slow. Sclera yellow 30th October, 1913 (6th day). Latterly delirious and pulse intermittent.	11 days (Hæmat-uria.)	11 days	Sub-tertian malarial rings. 1st day	12 days. Death
17	Male. Age 27. British. Eyes blue, hair fair, complexion fair. Lieut. S.N.R. October 27.	Obudu. Bush hut. Good station, well kept. Mountainous and hilly, open grass country with light bush. Dense forest and swamp in the south.	1 in 1910, 2 in 1913.	End of wet season. Oct. rainfall 12.09". year's rainfall 66.43.	Ticks, Anophelines, Culicines, Glossina.	West Africa 3 years. Present tour 6 months. India 1908-09. Temperate.	Several previous attacks of malaria.	None	Took quinine only when feeling seedy. 10 grains	11 a.m. 1st day.	Vomiting, temperature 102° F., spleen enlarged and palpable 25th October, 1913. Vomiting ceased next day, temperature 100° F., sweating. Hæmoglobinuria on 27th October, 1913, temperature 100° F., feels well. Temperature normal 28th October, 1913, hæmoglobinuria less. Slight yellow tinge in conjunctivæ. Urine clear 30th October, 1913. Recovery appeared to be hastened by quinine administration.	3 days.	3 days.	Sub-tertian malarial parasites two days before attack. Sub-sequent emanations negative.	8 days. Recovery
18	Male. Age 37. British. Eyes grey, hair brown, ruddy complexion.	Okwoga. Bush house. Open hilly country with light forest.	None	Beginning of dry season. Nov. rainfall nil, year's rainfall 57.12".	Anophelines, Culicines, Tabanus, Stomoxys, Glossina.	West Africa 5 years. Present tour 12 days. South Africa.	Influenza, "yellow jaundice."	None	5 grains euquinine. 10 grains.	4.30 p.m. 2nd day.	Rigors, bilious vomiting, severe loin pains, tenderness over liver, spleen and kidneys. Temperature ranging from 102° F.—105° F. Slight yellow tint of conjunctivæ and skin.	4 days.	4 days.	Negative	4 days. Death.

Col. Sergt. S. N. R. November 9.	Culicoides, Ticks, Stegomyia, Ceratopogon, Hematopota, Chrysops.	1899-1902. Moderate.	Several previous attacks of malaria. Enteric fever in 1907.	None	Took Quinine only when feeling "seedy." 5 grains.	6 a.m. 2nd day	Dark-coloured urine passed, which separated into two layers, an upper layer of dark beer, and a lower consisting of yellowish white sediment which proved to contain granular and hyaline casts, epithelial cells and debris. DR. MACLAINE.	4 days. 1 day.	4 days. 1 day.	Subtertian parasites on 1st day.	9 days. Recovery.
19 Male. Age 27. British. Eyes blue, hair fair, light com- plexion. Lieut. S. N. R. December 2.	Obudu. See No. 16.	Dry season. December rain- fall 0.06". See No. 16.	West Africa 1½ years. Present tour 8 months. Temperate.	Several previous attacks of malaria. Enteric fever in 1907.	None	Took Quinine only when feeling "seedy." 5 grains.	6 a.m. 2nd day	1st December, 1913, felt seedy, had headache. Quin. grs. V. at 6 p.m. 2nd December, 1913, chilly during night, 8 ozs dark urine at 6 a.m. Temp. 103.6° F., no pains, no vomiting, some nausea. Spleen palpable and tender. 3rd Decem- ber, 1913, temp. normal, very anæmic, jaundice present, urine clearer. 4th December, 1913, head- ache, more hæmoglobinuria, temp. 101° F. 5th December, 1913, urine clearer, temp. 101° F. 6th Decem- ber, 1913, temp. normal, urine clear. 10th December, 1913, another febrile attack with hæmo- globinuria. 11th December, 1913, better. Quinine was given until 10th December, 1913. DR. QUIRK.	4 days. 1 day.	Subtertian parasites on 1st day.	9 days. Recovery.
20 Male. Age 59. British. Ship's captain. Fair. December 2.	Steamer at Lagos	—	?	?	?	?	Fever, vomiting, hæmoglobinuria. Temp. on admission 102° F., gradu- ally fell to normal in 3 days. DR. LEONARD.	6 days.	6 days.	Subtertian parasites.	10 days. Recovery.
21 Male. Age 32. British. Eyes brown, hair fair. Merchant. December 14.	Sapele. Room in upper story of two-storey house. Very hot, no eaves, low- lying and swampy.	Dry season. Dec. rainfall 0.05" year's rainfall 105.85". average rain- fall 102.12". Mean max. temp. 83° F., Mean min. temp. 72° F.	West Africa 3 years. Present tour 11 months. Temperate.	Malaria frequently.	None	5 grains daily. 10 grains.	3 a.m. 1st day.	Jaundice, diarrhoea, vomiting. Tem- perature when first seen was 101° F.; after onset of hæmoglobinuria and jaundice fell to 98° F., pulse 100, very weak. Urine, typical "black- water," acid, and turned almost solid on boiling. The temperature just before death was 99° F. DR. SMYTHE.	4 days.	Negative	4 days. Death.

SIERRA LEONE.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 25 September, 1914.)

SIR,

Government House, Sierra Leone, 5th September, 1914.

I HAVE the honour to transmit herewith copy of a minute by the Principal Medical Officer covering reports on ten cases of blackwater fever which occurred in the Colony and Protectorate during the year 1913, together with a table and a map* indicating the localities in which the cases occurred.

2. The request contained in paragraph 3 of your despatch of the 31st March last, viz., that the European population should be stated, has not been complied with, but Medical Officers have been instructed to furnish this information in future.

I have, &c.,

E. M. MEREWETHER,

Governor.

Enclosure in No. .

From the PRINCIPAL MEDICAL OFFICER to the HONOURABLE THE COLONIAL SECRETARY.

I have the honour to forward herewith in quadruplicate for transmission to the Secretary of State the reports received on ten cases of blackwater fever which occurred during the year 1913. The reports are accompanied by a table and a map.*

2. Since I had been only four months in the Colony at the end of the period covered by these reports I do not propose to comment on the subject, but perhaps the following facts, which refer to case No. 9 and two others not included amongst these reports, are not without interest.

Case No. 9 occurred at Yonnibannah in the month of August.

In the month of November a second European, occupying the same room as the above, contracted blackwater fever, and at the end of November a third, who occupied the room in which the second formerly slept, had a severe attack of malarial fever.

A European official, who was in the habit of visiting the bungalow referred to above, went home with the second European (referred to in the preceding paragraph), sharing his cabin, and contracted blackwater fever soon after his arrival in England.

THOS. E. RICE,
Principal Medical Officer.

Colonial Medical Department,
Freetown, Sierra Leone,
12th June, 1914.

CASE 1.

CLINE TOWN.

This case may possibly be called blackwater fever, but in my opinion it should be reported as one of hæmoglobinuria, seeing that the course was unlike the classical clinical picture of blackwater fever. The case appears to conform with a type which may be classed with blackwater fever on account of the presence of hæmoglobinuria, and which is alluded to by Sir William Leishman and others in the November number of the transactions of the Society of Tropical Medicine and Hygiene (pages 2 and 21).

G. G. BUTLER.

* Not reproduced.

History.—The patient, aged 31, was a fitter on the railway completing his second tour. His health had been previously quite fair, but he had been on the sick list for “intermittent fever” and periostitis of the tibia. The attack of intermittent fever was not confirmed by blood examination, and in the light of his statement that he takes quinine daily in a 5-grain dose, the probability that this illness was due to malaria must be considered as doubtful. For twelve days during his first tour he tells me he was “down with fever.”

The man himself, I fancy, is not a very steady fellow, but I have not heard any complaints concerning him. He came under my notice, in the first place, on December 17th, when he called to see me about a painful swelling of his left tibia, which had been present since July, but had become worse since the beginning of December. This swelling I regarded as a gummatous periostitis, and I placed him on the recognised treatment for this condition.

On the night of December 17th he took his own temperature, and found it 103° . He complained of feeling “hot and cold,” but there was no definite rigor. Thinking he had fever he took 10 grains of quinine, though he had taken his usual 5 grains that morning. I visited him at 8.30 a.m. on December 18th and found his temperature normal. He then informed me that he had taken two further doses of 5 grains of quinine that morning. In view of the fact that he had taken 20 grains of quinine within 12 hours, I decided that it was useless to examine his blood for malaria, and told him not to take any further doses of quinine.

At 1.30 p.m. I was re-summoned to see the patient, as he had passed “black urine,” but, not receiving the note till 4.30 p.m., I did not see the patient until 5 p.m. There was no fever then, there had been no rigors, and no vomiting, but his urine was a dark port-wine colour, translucent and loaded with albumen; a total quantity of about eight ounces had been passed since noon. The patient was quite comfortable, and showed no signs of distress, except some slight mental excitement at the idea of blackwater.

The patient was removed at once to the Nursing Home, where frequent drinks of water were enforced and saline injections given per rectum every four hours. Not until about 3 a.m. did the patient pass any urine, the specimen then was only faintly blood stained, and on examination showed a fairly thick cloud of albumen and no red corpuscles; the next specimen passed appeared quite normal in appearance, and contained no albumen. There were no rigors and no vomiting or fever while in the Nursing Home, and the patient’s convalescence was rapid.

The special points called for in reporting this case are:—

1. *Locality.*—This may be considered fairly healthy; there is a swampy area just below the house occupied, but the river, being tidal, covers the swampy area with brackish water twice a day. Within 200 yards there is a considerable quantity of “bush.”

2. *Series of cases.*—There is no record of any other cases occurring recently in the neighbourhood.

3. *Insect fauna.*—*Stegomyia* are frequently seen during the rainy season, and the patient tells me that small black and noiseless mosquitoes are found in his house, though I have not observed this myself; but the description given corresponds with the common anopheline mosquito here (*Pyretophorus costalis*).

4. *The season.*—The case occurred during the early harmattans of the dry season. The temperature, in my own house, which is within a short distance, has varied between 80° and 90° during the twenty-four hours.

5. *Personal history.*—A fairly healthy man, I believe not very steady, and I fancy has had lues. He has had two attacks of “intermittent fever,” but there was no blood examination on either occasion, so that the possibility of malaria is not confirmed. He states that he takes his quinine regularly and daily in 5 grain doses. The conditions of the life he leads are fairly strenuous, and occasionally, I fancy, entail a fair amount of standing about in the sun.

6. *Examination of blood.*—This was only undertaken on one occasion, namely, December 19th, the morning after the first occurrence of “blackwater.” This

examination did not reveal the presence of any malaria ring forms or crescents, and the differential leucocyte count was as follows:—

					Total counted.	Percentage.
Polymorphonuclear leucocytes	...	...	...	...	148	49·3
Lymphocytes	...	...	...	...	115	38·3
Large hyaline	...	...	...	...	21	7·0
Eosinophil	...	...	...	...	16	5·3
					<hr/> 300	<hr/> 99·9

G. G. BUTLER,
Medical Officer.

CASE 2.

KOINADUGU DISTRICT.

This patient did not report his illness at the time nor receive medical attention. I think it best to give his own account of his illness, more or less in his own words.

JOHN Y. WOOD,
Medical Officer.

In answering your questions, I may state that I am not subject to repeated attacks of malaria, in fact, for the last two years or more I have had but once a temperature of 100°, excepting, of course, the blackwater in March, 1912.

Quinine I take in 5 grain (occasionally 10 grain) doses *regularly*, usually in the evening. I have done this for over three years.

My bowels are usually regular.

The first symptom I can detect about two days in advance, namely—lack of energy, irritability and general sluggishness. The next is a nervous headache, and a worn-out feeling similar to that of malaria. At this stage I consult the thermometer, and find it registers 100° or slightly over. Loss of appetite is to me always a red signal when combined with headache and sluggishness. This usually occurs about supper time. I immediately take to bed and take 10 grains quinine lest it be malaria. About 9 p.m. I note discoloured water, resembling at first very weak tea, which is followed by chill and great shaking. I apply hot water bags, drink hot tea or water, and in about 30 minutes my temperature is up to 104°, or perhaps 104·4°, and I suffer from heat, breaking afterwards into a profuse sweat. When I note the discoloured water I immediately stop quinine and phenacetin for the following reasons: (1) the quinine may upset my stomach and induce vomiting; (2) I was informed by a doctor that it was of little value in large doses in blackwater; (3) I drop the phenacetin to save my heart, and reserve it for the strain to follow.

My diet is restricted to milk, raw eggs and honey to avoid a full stomach. Liquid I drink in abundance, and with unceasing vigilance resist all attempts at vomiting or hiccuping. The latter I resist by deep breathing and holding my breath with inflated lungs till the desire leaves me. The water is discoloured only for four days and then clears, leaving me a physical wreck, as though I had been starved a month, and extremely weak, my heart being barely able to fulfil its functions, with the beat remarkably slow and irregular. The slightest motion causes faintness and exhaustion.

The urine in both attacks slowly clears on the fourth day about noon, and is normal in twenty-four hours.

The last attack was precipitated by undue exposure and exertion some six or seven days previously. Now, at the slightest sign of tiredness or lack of energy

I lay all work or exercise aside, take 10 grains of boric acid, and usually am fit in a short time, perhaps next day. This occurred about the middle of June.

—	1st day.	2nd day.	3rd day.	4th day.
Fever	104	100	99	98.
Headache	Not severe ...	None... ..	None... ..	None.
Pulse	Increased ? ...	Normal ...	Normal ...	Very slow.
Sweating and chills	Excessive ...	Slight chills	Cold feet ...	Entire body cold.
Urine	Like weak tea	Like strong tea	Like tea ...	Begins to clear at noon.
Sleep	Fairly good...	Good... ..	Good... ..	Good.
Urine quantity	About 8 ozs. e	very 6 hours.		
Kidneys	Dull ache ...	Dull ache ...	Dull ache ...	Dull ache.
Vomiting	None... ..	None... ..	None... ..	None.
Hiccup	None... ..	Slight ...	None... ..	None.
Appetite	None... ..	Slight ...	Slight ...	Slight.
Weakness	None... ..	After urinating, slight.	Increased ...	Extreme.
Remedies—Quinine	10 grains ...	5	5	5.
Boric Acid	10 grains every	6 hours.		
Oil of Turpentine	Half teaspoonful	morning and evening.		
Diet—Soft boiled egg 2nd and 3rd day	All the milk, e	ggs (raw) and honey I could take.		
Bowels	Normal ...	Normal ...	Normal ...	Normal.
Pain	Bodily ache...	None... ..	None... ..	None.

CASE 3.

BONTHE, SHERBRO DISTRICT.

The blackwater first manifested itself on the 17th October in the afternoon. The urine was the colour of stout, and had a copious deposit and two-thirds solid albumen on boiling. On the 18th the urine was clear sherry coloured, and showed slight albumen and débris. In a few days' time it was normal. On the 24th the patient got out of bed. On the 13th of November the patient had a variable temperature, and from the 6th November he had been taking 1 grain of euquinine three times a day. A recurrence of the blackwater took place on the 13th of November, and continued very severe till the 16th, when the urine became clear and albumen slight. The patient was very weak and I feared a fatal issue on the 15th and 16th; however, rectal saline injections were given along with hypodermic injections of strychnine and digitalin, after which the condition of the urine steadily improved and the patient regained strength. Jaundice and anæmia were very marked during this second attack. On the 21st a slight recurrence again took place, but the patient gradually improved, though some days later the urine was again, for a few hours, loaded with albumen.

Having come to the conclusion that the patient's present condition—intense anæmia, hæmic bruit, and slight jaundice, with slight trace of albumen in the urine—requires special nursing, I have advised that he be taken to the Nursing Home, Freetown.

ALEX. BREMNER,
Medical Officer.

CASE 4.

DEAH, NORTHERN SHERBRO.

Locality.—(a) The house is low, mud-walled, tin-roofed, and very hot in the daytime. At one side, about two hundred yards away, the River Wanjai flows. There are several native houses close up on this side. At the back and on the other side the bush has been allowed to grow right up to the verandah. The bush at the back slopes down to a swamp, two hundred yards away. In front there is a compound containing the stores and shop. This is about fifty yards square, and is kept clear of grass, &c.

The houses of the native town are only about twenty yards away from the boundary of the compound.

(b) There has been one other case of blackwater fever at Deah. This occurred last September. The patient was a German trader and lived in a house only twenty yards away from the house in which the present case occurred.

(c) *Biting flies*.—A few tabanus, mosquitoes, culx and *Stegomyia fasciata*. No other biting insects were seen.

Seasonal variation.—Both the cases above referred to occurred at the end of the rains.

Personal history.—(a) The patient has been resident in Sierra Leone for two years and four months. He states that he has had several attacks of fever, but can give no definite diagnosis as to what variety of fever. Patient has suffered from bad teeth for the last two years, and gets frequent attacks of indigestion. He has been in the habit of taking quinine, grains 3, daily, and says he has been fairly regular in this respect.

(b) He has spent all the time he has been in Sierra Leone in the Sherbro district. He was some months at York Island, was then moved up to Sumbuya, and from there came to Deah.

(c) No microscopic examination was made of the blood, as there are no slides or microscope in this district.

W. A. NICHOLSON,
Medical Officer.

CASE 5.

FREETOWN.

The patient, a Syrian trader, living in Freetown, was admitted into the Colonial Hospital on December 23rd complaining of fever, some pain in the loins, and passage of bloody urine. On examination his temperature was 105°, pulse 120, tongue furred; he had some tenderness in the loins, and a spleen palpable below the costal margin. Urine was passed which was a little darker than port wine, and on examination showed albumen, a few blood cells, and hæmoglobin.

A blood examination showed the presence of subtertian malaria. Hot fomentations over the kidney region, and phenacetin in 10-grain powders, together with Sternberg's mixture, were prescribed, and a low milk diet with copious draughts of mineral waters given.

In a couple of days the urine began to clear up; but there was a good deal of vomiting, which was eventually checked by a mustard poultice to the epigastrium, and bismuth powders.

The temperature returned to normal on December 27. The quantity of urine passed was rather more than normal.

On the third day after admission he showed an icteric tint over his whole body, but it was not so pronounced as is usual in blackwater fever.

No quinine was given during the attack. He left hospital on January 2nd.

Before admission to hospital he had fever and pains in the loins for about three weeks, but did not report sick until he passed dark-coloured urine.

He states that he has had several attacks of malaria during his stay in Freetown.

H. E. ARBUCKLE,
Medical Officer.

CASE 6.

BONTHE, SHERBRO ISLAND.

The patient, whose age is 21, was born in East Africa, and remained there till two years ago. He then went to Paris and Manchester, spending a year between the two places. He subsequently came to West Africa, and was sent to Sherbro; he had been there for one year.

He is a small, thin, weedy youth, with a pale, pasty, blotchy, unhealthy-looking complexion.

I had been treating him for a week previously for gastritis, from which he had practically recovered.

On Saturday, August 23rd, in spite of my advice with regard to dieting for his gastritis, he had beef steak and kidneys for lunch. This gave him considerable gastric pain, and he vomited. He then had a rigor with shivering and went to bed; getting up about an hour later to pass water, he found his urine black. I saw him at 5 p.m.; temperature $102\cdot4^{\circ}$, pulse 123 per minute; sweating slightly; tongue furred; liver and spleen enlarged and tender; skin and conjunctivæ lemon yellow in colour. Vomiting had occurred once or twice, but had stopped when I saw him. The urine was not seen as it had been thrown away. The patient was told to stop in bed, and also warned as to the danger of getting out of bed or even sitting up. No medicine was given as he had already taken a good dose of Epsom salts.

24th, 9 a.m. Temperature 99° , pulse 80; had a fairly good night. Passed about 24 ozs. of urine, which looked at in chamber pot was black, but on tilting the utensil to get a thinner layer it showed a distinctly dark red colour. On diluting the urine the red colour became very apparent. There had been no vomiting; the skin was a deeper yellow. Given Sternberg's mixture every three hours, and advised to drink fluid, Vichy or Sauerbrunnen water and milk *ad libitum*. 5 p.m. same day: temperature $100\cdot2^{\circ}$, pulse 96, of good volume and regular, no vomiting. Urine unchanged, and passing a good quantity, but not kept for measuring—only a sample kept; general condition fairly good; is not frightened, as he does not realise that he has blackwater fever; spleen and liver not now tender; spleen not palpable, though increased in size. Liver on percussion still slightly enlarged. Colour of skin and conjunctivæ somewhat darker. Complains of aching across loins. Advised hot fomentations to loins.

25th, 9 a.m. Slept fairly well; skin slightly lighter in colour; passing a good quantity of urine; urine not kept for measurement, and only a small specimen kept for inspection. Urine somewhat lighter in colour. Temperature $99\cdot6^{\circ}$, pulse 94. Still complaining of loin pain. Treatment continued. 5 p.m. Temperature $100\cdot8^{\circ}$, pulse 118. Vomited once during the afternoon; vomit consisted of green bile. Passed 35 ozs. of urine (measured), which is red, but a much lighter colour. Still complaining of loin pains, otherwise fairly comfortable, though weak.

26th, 9 a.m. General condition, good; is quite comfortable; the only thing he complains of is that he drops everything; he is very weak. Temperature $98\cdot6^{\circ}$, pulse 82. Urine much clearer, and has now the colour of Madeira, and is not red. Skin same as yesterday. Soft systolic murmur heard all over cardiac area, due to anæmia. 5 p.m. Feeling very unwell; tried to sit up in bed, and changed his pyjamas himself, and, very naturally, fainted. Temperature normal, pulse 70, rather weak and occasionally intermittent. Urine normal, no albumen; passed about 30-35 ozs. since 9 a.m.

An hypodermic injection of digitalin and strychnine was given, and a friend of his was warned to keep him under special observation so as to prevent his trying to help himself. Champagne in small repeated doses was recommended.

The following mixture was ordered:—

R Ferri et Ammon. Cit.	...	...	grs. 5.
Liq. Arsenicalis	...	...	℥ 2.
Aq. Ad.	...	...	5 ss. t.d.s. ex. aq. p.c.

27th. Convalescent. Skin nearly clear; very anæmic and weak. Urine quite clear.

31st. Systolic murmur has disappeared.

1st. Found out of bed, feeling and looking very well; has some colour (pink) in his face.

Quinine history.—Did not take quinine regularly, only if he felt unwell. Had taken 1·6 grammes of quinine in divided doses just before he developed blackwater fever.

Locality.—Sherbro Island; low-lying and marshy.

House a few yards from Heddle Swamp.

Insect fauna.—Tabanids, glossinæ, sand-flies, and mosquitoes.

Previous cases.—There have been several cases, but I do not know the number.

Seasonal variation.—Rainy season. Rainfall for month, 37 inches.

E. W. WOOD-MASON,
Medical Officer.

CASE 7.

PUJEHUN, NORTHERN SHERBRO DISTRICT.

Pujehun is a trading station up the Wanje River; it is a very malarious place, being surrounded by marsh land; mosquitoes are very numerous. The patient, whose age is 24, lived in a wooden house raised above the ground about eight feet on concrete or stone pillars.

I am informed by others that the house and its surroundings were kept in a filthy condition.

The patient had a slight attack of hæmoglobinuria about a week ago. I was informed of this by a member of a trading firm who had visited him at the time and advised him to come down to Bonthe for treatment; this the patient refused to do.

On Saturday, 23rd August, he appears to have taken a large dose of quinine, about 25 grains of sulphate, having previously been very irregular in taking quinine.

The present attack of hæmoglobinuria started on Tuesday, 24th, and a dispenser brought him down to Bonthe by launch, the voyage lasting twelve to fourteen hours.

I saw the patient at 2 a.m., on the 26th; he was exhausted by the voyage and was collapsed; temperature 98° , pulse 78, thready and weak, with a tendency to be intermittent. He had been vomiting green bilious fluid on the way down, but vomiting had stopped when I saw him. The urine was not seen, as it had not been kept; he had passed a small quantity during the voyage down. Skin and conjunctivæ were a dark yellow colour; he was sweating slightly.

A hypodermic injection of digitalin and strychnine was given, and he was put to bed and kept warm with blankets and hot water bottles.

26th, 8.30 a.m. He has passed no urine since arrival; he vomited once or twice during the night. Temperature 100.8° , pulse 104, stronger and regular. Still sweating, but not vomiting.

Given Sternberg's mixture and champagne. Hot fomentations continuously to loins. A native nurse was sent to look after him and administer rectal injections of hot saline solution, 1 pint every two hours, in the hope of warding off anuria. General condition bad; prognosis grave. Given mineral water and barley water at regular intervals throughout.

26th, 5 p.m., temperature 102° , pulse fairly good, is more comfortable; has passed no urine, but feels that he wants to; treatment continued, but saline injection reduced to half pint, as they are not retained for very long; the fæcal matter voided with the saline solution is black in colour. The skin is lighter in colour.

27th, at 6 a.m., temperature 101° ; 10 a.m. 102.6° ; 2 p.m., 103.8° ; 6 p.m., 103° ; and 10 p.m., 101.8° . Pulse 110 to 120, fairly good. Has passed no urine yet; vomited green bile once or twice. The following mixture was given:—

R Spt. Aetheris Nit.	...	...	...	5 iv.
Tr. Digitalis	...	...	...	5 i.
Tr. Aurantii	...	...	...	5 iii.
Spt. Chloroform	...	...	...	5 ii.
Aq. Ad.	...	...	...	5 xii. 5 i. three-hourly.

Rectal injections are continued and retained well now.

28th, temperature normal at 6 a.m., pulse 102, fairly good. Skin much lighter: has vomited once or twice. No urine passed. Unfortunately I had left my transfusion apparatus in Freetown or I should have given injections of saline solution subcutaneously, and, if that failed, intravenously. At 10 a.m. the temperature was 100° , and subsequently 101.2° at 2 p.m., coming down again at 6 p.m. to 100° , and at 10 p.m. to 99.6° ; the pulse varied from 102 to 100. No urine passed; condition much the same as before.

29th. General condition much the same; no urine passed; skin lighter. Temperature rose at 6 p.m. to 99.6° , falling subsequently; the pulse varied during the day from 100 to 80.

30th. Nothing special to report. Temperature only rising during day to 99° .

1st September. Temperature dropped at 6 a.m. to 97° , and the pulse to 72. Hypodermic injection of digitalin and strychnine $\bar{a}\bar{a}$ 1/100 grain given and repeated at intervals; pulse dropped to 56 later on. No urine passed.

This condition lasted till the evening of 4th, when I handed the case over to Dr. Bremner, who informed me that uræmic symptoms, headache, and muscular twitchings set in during the night, and that the patient died on the 5th.

This case is of interest, owing to the length of time that suppression of urine lasted without uræmic symptoms developing.

I can give no details of Pujehun, as I do not know the place.

E. W. WOOD-MASON,
Medical Officer.

CASE 8.

This patient was aged 25.

Previous history.—

Length of service on West Coast, $2\frac{1}{2}$ years.

Leave of absence from Coast, 11 weeks.

Last tour, 23 months 1 week.

Malarial history.—Four attacks of malaria during tour, and one at home.

Quinine history.—Acting on medical advice, he says he took 10 grains of a salt of quinine (probably sulphate) once a week; this, he says, he did regularly.

Quarters occupied.—A house at Port Lokkoh, built of wood on concrete pillars, and about nine months old.

There has been no previous case in the house.

Present attack.—Captain MacEntire, R.A.M.C., was called in on June 22, and found him in a very weak condition; pulse bad and frequent, 110 to the minute; temperature $103\cdot6^{\circ}$; urine normal in colour and reaction. He was given a quinine mixture and probably took three doses (grains 5 to 5 i). He thus had 15 grains of quinine.

23rd. Now passing small quantities of urine with hæmoglobin in it; heart extremely weak, necessitating administration of strychnine hypodermically and champagne. Sternberg's mixture given. Vomiting continuously. Brought to Nursing Home by Captain MacEntire on 27th June. On admission patient came under my care; he was weak and anæmic, though his condition was fair; pulse fairly good, stood journey well. Tenderness over liver, spleen and bladder. Tongue fairly clean. No vomiting; jaundice slight. Mouth in a bad condition from pyorrhœa alveolaris. Urine not seen as none passed, but it had been distinctly red during the day. Sternberg's mixture continued, with hot fomentations to loins; instructions given to administer half pint of saline solution per rectum every two to three hours if urine remained scanty. Milk and soda and sauerbrunnen given.

28th. During last few days patient has passed good quantities of urine with hæmoglobin in it, which has now become clear, and the colour of dark tea with only a trace of albumen. Condition improved. Jaundice disappeared.

29th June. Urine greatly increased in quantity, and free from albumen.

30th. Pulse good; allowed to sit up in bed.

1st July. Allowed out of bed.

3rd. Discharged cured.

Convalescence rapid and uninterrupted. Blood examination at onset and the day after admission negative.

E. W. WOOD MASON,
Medical Officer.

CASE 9.

YONNIBANNA DISTRICT.

This patient has had $3\frac{1}{2}$ years altogether on the West Coast, at the Gold Coast and in Sierra Leone. He states that his time was spent mostly in the bush, and that "decent" quarters were usually provided for him.

Quinine prophylaxis, with him, was 5 grains of a salt of quinine, usually the acid sulphate, taken every alternate day. The amount always gave him "a buzzing in the ears." He states that the tabloids were never sugar coated. He is at present in the seventh month of his tour, which has been spent in the Yonnibanna District. At first, for three months, he lived in a tent; subsequently he lived in a comfortable and good wood and iron house, which was mosquito proofed. He states that he also always used a mosquito net. The last five or six weeks he had observed mosquitoes in the house, and admits that he had found gorged specimens inside his net. While on the Gold Coast he suffered from a good deal of fever, but, being the only European

in charge of the place, he was unable to lie up for illness. As far as he remembered he had had altogether seven or eight attacks of fever. In March, 1913, he had what was thought to be a bilious attack, lasting for a fortnight "on and off," which the doctor said was "fever." Since then he has had a day occasionally in bed with "fever." In appearance the patient is rather slight, and of average height and size. He is a moderate smoker and drinker, does not suffer from dyspepsia, and has a good appetite.

Present illness.—About the 18th of July he felt a sensation of "all gone-ness," but did not "lie up" until the 23rd. He had during this time been taking 15 grains of quinine daily. On the 23rd vomiting began, which prevented him taking more. On the 24th he noticed he was passing blood instead of urine, which became darker on the 25th and 26th. Vomiting continued throughout. Patient was admitted into the Nursing Home on the 26th at 5.10 p.m., having arrived in Freetown by train from Yonibanna, a journey of eight hours, in a collapsed and exhausted condition. He suffered from distressing vomiting, and was markedly jaundiced. His temperature was 101.2° F., the pulse 100 per minute. Respiration 24 per minute. He was put to bed at once, and an enema of soap and water given. Brandy was prescribed in frequent small doses, and phenacetin, grs. xii, given.

27th. Urine, 42 ounces passed, hæmoglobin present, with albumen. The blood was examined, but no malarial parasites were found. Temperature was 98.6° F., the pulse 80, and respirations 20 per minute. Saline injections of normal solution were given every fourth hour. Vichy water and "Sparklet" were allowed *ad lib.* Wyeth's beef juice, one tea spoon, was administered every third hour.

28th. The urine passed measured 42 ounces and was clear. The temperature at 2 p.m. rose to 102.4° F., pulse was 106, and the respirations 20 per minute. The treatment was continued.

29th. Urine 30 ounces, temperature at 6 a.m. was 99° F. Urine contained a trace of hæmoglobin, and was pink. Temperature at 6 p.m. was 102.2° F., pulse 108, and respirations 20 per minute.

30th. Urine 38 ounces, and was clear. Temperature normal at 6 a.m., and 100° F. at 6 p.m.

31st. Urine 62 ounces, clear, temperature 102° F. at 10 a.m.

1st August. Sixty-two ounces, clear. Temperature ranged between 99° F. and 100° F.

2nd. Urine 72 ounces, patient convalescent.

6th. Patient was invalided to England—convalescent, extremely weak.

J. WALLACE COLLETT,
Senior Medical Officer.

CASE 10.

FREETOWN.

The patient, a Syrian trader, called me in on 11th November, 1913, as he was passing urine which was reddish black. He had some pain in the loins, headache, and a temperature of 101.8° . He was placed in bed, given Sternberg's mixture every three hours, and copious draughts of aerated mineral waters and milk; he vomited once. The temperature in the evening fell to 100.6° , but the urine was still reddish black or brown; there was very slight jaundice. The urine contained hæmoglobin and albumen with a few red blood cells. Examination of the blood was negative for malaria.

On the 12th the temperature fell to 99.6° in the morning, and 99.2° in the evening; the urine was still dark, but that night began to get paler.

On the evening of the 13th the urine cleared, temperature was normal, and continued so.

The patient acknowledged one attack of fever previously, about three months before present illness. He had been in the habit of taking 5 grains of quinine occasionally, and until day of attack had not touched quinine for a fortnight; at 7 a.m. on the 11th he took 5 grains of quinine, and at 10 a.m. passed dark urine.

His residence was in one of the main business streets of Freetown.

H. E. ARBUCKLE,
Medical Officer.

No.	Description, Date.	Station, Quarters, Physical features.	Multiplicity of cases.	Insect Fauna.	Season.	Previous illness.	Previous Blackwater.	Quinine habits.
1	Male, age 31. December 18th, 1912.	Clinetown. Railway Reserve. House near a swamp and tidal river. Flat, low-lying.	None ...	Chiefly Stegomyia.	End of rains	States two attacks of malaria.	None ...	States he has 5 grains daily. Took 20 grains within the twelve hours before attack.
2	Male. June, about 15th.	Kerifia ...	?	?	Early in the rains.	No malaria for two years. Blackwater in March, 1912.	March, 1912 ...	5 grains daily for last three years; 10 grains just before onset.
3	Male. October 17th	Bonthe ...	?	?	Rains ...	?	?	?
4	Male ...	Deah (Sherbro), 200 yards from river. Near native houses.	One case a few months before, in a German living 20 yards away.	Tabanus, Culex, Stegomyia.	At the end of rains.	Several attacks of "fever."	?	Takes 3 grains daily.
5	Male. Syrian, Trader	Kissy Road, Freetown. Thickly populated with natives. At the bottom of the hill.	None recently known.	Stegomyia, Culex, Anopheles. Not in large numbers.	Dry season...	Several attacks of "malaria."	None ...	?
6	Stores Assistant. August 23rd, 1913.	Sherbro Island. Low-lying and marshy. House a few yards from Heddle swamp.	Several cases previously reported.	Tabanids, Glossinae, Mosquitoes.	Rainy season	Gastritis just before attack.	?	Only takes quinine if feeling ill. Took 1.6 gm. in divided doses just before attack.
7	Stores Assistant. August 23rd, 1913.	Pujehun, North Sherbro. Surrounded by marsh land. House wooden, raised from ground on stone pillars. Dirty.	—	—	Rainy season	—	Slight attack of hæmoglobinuria a week before.	Takes it irregularly. Took 25 grains previously.
8	Stores Assistant. June 22nd, 1913.	Port Lokkoh. Low-lying and marshy. House new, wooden.	No previous case in this house.	—	—	Four attacks of malaria in West Africa. One in England.	—	Takes 10 grains once a week. 15 grains in three doses just before attack.

No.	Description, Date.	Station, Quarters, Physical features.	Multiplicity of cases.	Insect Fauna.	Season.	Previous illness.	Previous Blackwater.	Quinine habits.
9	Male. July 26th, 1913	Yonnibanna. House, wooden, mosquito proofed.	—	—	Wet season...	Repeated attacks of malaria. Last attack three or four months ago.	—	5 grains on alternate days. Took 15 grains daily for the five days previous to attack.
10	Syrian. November 11th, 1913.	Rawdon Street, Freetown. In midst of business premises.	—	Stegomyia, Culex, Anopheles, but few in number.	End of rains	One attack of fever.	None ...	Taken 5 grains occasionally. None for fortnight previous, until day of attack.

No.	General Symptoms.	Duration of Hæmoglobinuria.	Blood.	Treatment.	Result.	Reported by
1	Temperature state 103°. Jaundice, none. Vomiting, none. Urine, colour of dark port wine. 15 hours. Albumen.	About 15 hours...	No parasites. Pn. 49·3%. L. 38·3%. L. M. 7 %. Eos. 5·3 %.	Copious drinks of water. Saline injections.	Rapid Recovery	Dr. Butler.
2	Temperature 104°; 2nd day 100°; 3rd day 99°. Jaundice and vomiting, none. Urine, like weak tea, darker on the 2nd day.	About 4 days ...	?	Abundant drinks of water. Boric acid (10 grains). Ol. terebinth, m. 30, m. and n.	Recovery ...	Dr. J. Wood.
3	Temperature variable. Jaundice, slight, but in the relapse on November 13th marked. Urine, stout colour. Albumen.	2 days. Relapse 4 days.	?	Rectal injections of saline. Strychnine, digitalis.	Sent to Freetown	Dr. Bremner.
4						Dr. Nicholson.
5	Temperature 105°. Jaundice, slight. Vomiting much. Urine, darker than port wine. Albumen.	2 days ...	Subtertian parasites found.	"Sternberg's" mixture. Copious drinks of mineral waters.	Recovery ...	Dr. Arbuckle.
6	Temperature 102·4°. Jaundice, present. Vomiting a little green bile. Urine, nearly black. Systolic murmur for a few days. Pain over loins. Liver and spleen enlarged and tender.	3 days ...	—	"Sternberg's" mixture three hourly. Water and milk <i>ad lib.</i>	Recovery ...	Dr. Wood-Mason.
7	Temperature 104°. Jaundice, marked. Vomiting green bilious fluid. Urine, suppression, followed by uræmic symptoms and death.	—	—	"Sternberg's" mixture. Rectal saline injections. Barley water to drink.	Death ...	Dr. Wood-Mason.
8	Temperature 103·6°. Jaundice, slight. Urine, colour of dark tea. Trace of albumen. Vomiting, none. Pain over liver, spleen and bladder.	About 5 days ...	Examination at onset and later both negative.	"Sternberg's" mixture. Saline solution per rectum $\frac{1}{2}$ pint every 2 or 3 hours. Milk and soda. Hot fomentations over loins.	Recovery ..	Dr. Wood-Mason.
9	Temperature, 101·2°. Jaundice, marked. Vomiting continuously. Urine, hæmoglobin and albumen present.	About 4 days ...	Malaria parasites not found.	Saline injections every four hours. Vichy water to drink <i>ad lib.</i>	Recovery ...	Dr. Collett.
10	Temperature 101·8°. Jaundice, very slight. Vomiting once only. Urine, dark brown. Hæmoglobin, albumen and red blood present in urine. Took 5 grains of quinine in the morning and in three hours hæmoglobinuria, pain in loins and head developed.	2 days ...	Negative... ..	"Sternberg's" mixture. Copious draughts of aerated mineral waters.	Cured ...	Dr. Arbuckle.

EAST AFRICA PROTECTORATE.

THE GOVERNOR to THE SECRETARY OF STATE.

(Received 30th October, 1914.)

Government House, Nairobi,
British East Africa,

SIR,

September 24th, 1914.

I HAVE the honour to transmit herewith the Annual Report on Blackwater Fever in this Protectorate for the year 1913.

2. It is somewhat difficult to give the European population in each area. The approximate figures are as follows :—

<i>Locality.</i>	<i>European Population.</i>					
Mazeras	10
Rabai	15
Shimba Hills	10
Punda Milia	10
Magadi	50
Yonte	25
Eldoma Ravine	5
Mombasa	400
Mackinnon Road	nil.
Mariakani	nil.
Kisumu	150
Kilindini (Mombasa)	400

I have, &c.,

H. CONWAY BELFIELD,

Governor.

Enclosure.

EAST AFRICA PROTECTORATE.

Blackwater Fever.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Race, Age and Sex.	
Mazeras ...	—	—	—	—	1	—	—	—	—	—	—	—	European, 49, m.	Recovery.
Rabai ...	—	—	—	—	—	—	—	1	—	—	—	—	European, 40, m.	Death.
Shimba Hills	—	—	—	—	—	—	—	—	1	—	—	—	European, 26, m.	Recovery.
Punda Milia	—	—	1	—	—	—	—	—	—	—	—	—	European, 21, m.	Recovery.
Magadi ...	—	—	—	—	—	—	—	—	1	—	—	—	European, 56, m.	Death.
Yonte ...	—	—	—	—	—	—	—	1	—	—	—	—	Nandi, m.a. ...	Death.
Eldoma	—	—	—	—	—	—	—	—	—	1	—	—	Indian, 25, m. ...	Recovery.
Ravine.														
Mombasa ...	—	1	—	—	—	—	—	—	—	—	—	—	Indian, m.a. ...	Death.
Mackinnon	—	1	—	—	—	—	—	—	—	—	—	—	Anglo-Indian, m.a.	Recovery.
Road														
Mariakani ...	—	—	—	—	—	1	—	—	—	—	—	—	Indian, m.a. ...	Recovery.
Mariakani ...	—	—	—	—	—	—	1	—	—	—	—	—	Indian, m.a. ...	Recovery.
Kisumu ...	—	—	—	—	—	—	—	1	—	—	—	—	Indian, m.a. ...	Recovery.
Kilindini ...	—	—	—	—	—	—	—	—	—	1	—	—	Indian, m.a. ...	Recovery.
Kilindini ...	—	—	1	—	—	—	—	—	—	—	—	—	Indian, 30, f. ...	Recovery.
Kilindini ...	—	—	—	—	—	—	—	—	1	—	—	—	Indian, 27, f. ...	Recovery.

The above table sets forth the recorded distribution, in regard to both time and place, of those cases of blackwater fever which came under notice during the year 1913. Of the total number five were Europeans, one an Anglo-Indian, eight were Indians, and one an African. The two manifestations of the disease noted against Mariakani occurred in the same individual. In respect of professional attendance, eleven of the patients were seen by medical men and four by junior members of the Department. Thirteen of the patients were males, two were females.

I. *Locality*.—(a) *Physical Features*.—So far as the locality is concerned, Eldoma Ravine and Punda Mlia have an altitude each of over 5,000 feet, while Mazeras, Rabai, Shimba Hills, Magadi, Yonte, Kisumu, Kilindini, Mackinnon Road, and Mariakani lie at lower levels.

Eldoma Ravine (7,145 feet) is situated on a small eminence among the Mau Hills, being located in the neighbourhood of considerable stretches of forest.

Punda Mlia (4,560 feet, approximate), on the Nairobi-Fort Hall Road, is in rolling grass country, well watered, with bush and patches of marsh along the lines of the water courses.

Magadi (2,047 feet) is situated in a hilly and waterless area, intersected with sandy plains covered with scrub.

Mariakani (682 feet) is a station on the Uganda Railway. During the rainy season swamps are to be found in its neighbourhood.

Shimba Hills (1,476 feet), Rabai (680 feet) and Mazeras (564 feet) are all within a radius of twenty miles from Mombasa, and may be described as being on the verge of the Taru wilderness.

Mackinnon Road (1,174 feet) is a station on the Uganda Railway, situated in the Taru wilderness.

Kilindini and Mombasa are located on Mombasa Island, a place presenting considerable areas of cultivation as well as a certain amount of bush. The town of Mombasa is on its eastern side, and mangroves grow on its northern and western shores.

Kisumu (3,890 feet) is situated on the shores of Kavirondo Gulf at the lake terminus of the Uganda Railway. Swampy and bush-covered areas are to be found in its neighbourhood.

All the above places, except Eldoma Ravine, are situated in areas classed as unhealthy.

(b) *Occurrence of a series of cases in any one place*.—None of the cases reported, so far as is known, forms part of a series. The disease has, however, before now manifested itself at Yonte and Kisumu.

(c) *Insect Fauna*.—The undernoted insects have been found at the following places mentioned in the opening table:—

Mazeras.—Mosquitoes are reported by one of the patients as having been troublesome at this place. Anophelines have been also observed here.

Rabai.—*Pangonia comata*, Aust.; *Hæmatopota pertinens*, Aust.; *Hæmatopota mactans*, Aust.; Anophelines.

Shimba Hills.—*Glossina pallidipes*; *Hæmatopota mactans*, Aust.; *Tabanus tæniola*, P. de B.; *Ornithodoros moubata*; Culicines and Anophelines.

Punda Mlia.—*Hæmatopota hirta*; *Culex pipiens*; *Anopheles mauritianus*.

Magadi.—*Dorealoemus wöosnami*, Aust.; *Hæmatopota tumidicornis*, Aust.; *Hæmatopota vittata*, Lene; *Hippobosca capensis*, Olf.; *Hippobosca maculata*; *Hippobosca struthionis*, Jans.; *Lyperosia minuta*, Bezzi; *Lyperosia*, sp. nov.; *Ochelerotatus quasiunivittatus*, Theo.; *Olfersia pilosa*, Macq.; *Stomoxys calcitrans*; *Tabanus suffis*, Jaen.

Yonte.—Anophelines have been observed close to the present station during the rains.

Eldoma Ravine.—*Hippobosca maculata*; *Hæmaphysalis leucki*; Culicines.

Mombasa Island.—*Culex pipiens*, L. Var. *pallidocephalus*; *Culex tigripes*; *Glossina pallidipes*; *Glossina austeni*, Newst.; *Stegomyia fasciata*; *Bauksinella luteolateralis*; *Pyretophorus costalis*; Tabanids.

Mackinnon Road.—Mosquitoes, culicine and anopheline, in the wet season.

Mariakani.—Mosquitoes, culicine and anopheline, in the wet season.

Kisumu.—*Mansonina uniformis*; *Nyosorhynchus mauritianus*; *Pyretophorus costalis*; *Bauksinella luteolateralis*; *Culex tigripes*; *Tabanus africanus*, Gray; *Hæmatopota unicolor*, Ric.; *Culex*, sp. incert.

Kilindini.—*Vide* Mombasa Island.

II. *Seasonal Variation*.—Nine of the recorded cases occurred in the cool season of the year, i.e., between the months of April and September inclusive.

III. *Personal History*.—(a) *Medical History*.—In fourteen of the cases histories of previous malaria are given. The fifteenth, it may be remarked, comes from Kisumu and probably had a like history. One of the patients—he who had two manifestations of blackwater in the year under review—is noted as a “regular

quinine taker," another was habitually administered five grains twice a week, and the remainder either took the drug irregularly or when they thought they had need of it.

In six of the patients, at least, quinine had been taken just prior to the onset of the hæmoglobinuria. One of the patients had undergone treatment for urethritis the month prior to the onset of hæmoglobinuria. So far as Europeans are concerned, their period of residence in the Protectorate varies between ten months and fifteen years.

(b) *Previous movements and personal conditions.*—A perusal of the histories of the various cases gives one to think that they show evidence of a want of self-attention so far as the treatment of antecedent malarial infection is concerned. The male patients would appear to have followed occupations which either brought them into close contact with Africans or exposed them to the attacks of mosquitoes and the vicissitudes of outdoor life.

(c) *Microscopic examination of the blood.*—Subtertian parasites were found in a blood film taken from one of the patients prior to the development of blackwater. Films made after its onset in nine of the cases were noted as negative on examination. In five either no record was made or no examination instituted.

From a consideration of the information afforded by the available histories of the cases under notice it may be stated that probably the patients.

- (a) had been infected with malaria prior to the development of hæmoglobinuria; and that the majority of them
- (b) have no record of having taken quinine systematically;
- (c) manifested the disease in localities rated as unhealthy, and
- (d) followed outdoor occupations.

In conclusion, I have the honour to transmit herewith the medical histories and an entomological list wherefrom this report has been mainly compiled.

J. A. HARAN,
for Principal Medical Officer.

Case 1.

Male, *aet* 21, a planter. Admitted 7th March, 1913. This case came from Punda Milia, in the Fort Hall district. He had been only 20 months in the country, was temperate in his habits, and there was no history of contact with native women. He had had several severe attacks of malaria and had taken quinine very irregularly.

History of attacks.—On March 3rd and 4th he felt seedy and thought he had another attack of fever. Took quinine, grs. xv, that day and repeated it next day. On the 5th he vomited and noticed his urine very dark red and went to Fort Hall to get medical advice. Bowels opened five times that day. Yesterday he had a rigor, temperature 104·6°. Complains of pains across the loins.

On admission, temperature 97·6°, pulse 80, respirations 20. Slight jaundice present. Tongue dry and coated.

Spleen large and hard and reaches almost half-way to the umbilicus. Other organs normal.

Urine dark red and transparent. Albumen abundant. Blood cells absent. Casts abundant.

No parasites found in the blood.

Treatment.—He was put on to Sternberg's treatment.

Sod. Bicarb., grs. 150,

Hyd. Perchlor., gr. $\frac{1}{3}$,

Aq. ad. 0 ii.

of which 1 ounce was to be given every two hours.

Plenty of Bland fluids were to be given and he was put on to a milk diet.

Bowels opened well with an enema.

8th March, 1913. Urine, 7 ounces, passed during the night. No vomiting, and he seems quite comfortable. Temperature rose to 101° last evening, but is normal to-day. Urine less red.

9th March, 1913. No further rise of temperature. Urine still contains albumen but is no longer red. He passed 55 ounces in the last twenty-four hours.

Very comfortable.

11th March, 1913. No albumen in urine now. Temperature remains down and he is very comfortable.

He was discharged fit on 24th March, 1913, and went for a trip to England.

Has since returned and has kept in good health.

No quinine was given during his stay in hospital, but he was instructed to take small doses regularly for three months after discharge.

Locality.—Punda Milia is situated in a rolling grass country, well watered, with bush and patches of marsh along the lines of the water courses.

No other cases occurred in the locality.

The following biting insects have been noted in the district :—

Hæmatopota kirta.

Culex pipiens.

Anopheles mauritianus.

The case occurred during the dry season, before the onset of the rains.

JOHN L. GILKS,
Medical Officer.

Case 2.

Male, *act* 56, a planter. Admitted 4th September, 1913. This patient had been 15 years in the country and had constantly been moving about. He had recently come from Magadi. He was a married man, and there is no history of contact with native women. A heavy drinker.

Had suffered frequently from malaria, especially in the past two years, and gave a history of getting up at nights to pass urine.

History of attack.—Ever since 23rd August, 1913, he had been having fever. On 1st September, 1913, the blood showed subtertian parasites, and he was given two injections of quinine, grs. x, intramuscularly. The day before admission he passed urine looking like pure blood. Vomited once.

On admission, temperature 97·4°, pulse 68, respirations 22. Tongue coated. Face and conjunctivæ jaundiced.

Circulatory system degenerate.

Spleen and liver not felt.

Nothing found in blood slides.

Treatment.—He was put on a milk diet with plenty of bland fluids to be taken by mouth and given a half drachm of sodæ bicarb. in water every three hours.

5th September, 1913. Bowels opened after a small dose of salts.

Vomiting at intervals. No urine passed since admission. Pulse good. Put on to rectal injection of saline 0 i every two hours.

6th September, 1913. Only one ounce of urine passed since admission.

Urine dark red and goes almost solid on boiling.

Microscopically it is full of débris with a very few blood cells.

7th September, 1913. No more urine passed. Had intravenous injection of saline 0 i last night and again to-day.

Vomiting. Pulse remains good.

8th September, 1913. Has passed a little urine, which is clearer and less albuminous. No vomiting now. Taking fluids well. Two pints of saline infused intravenously last night. He is getting puffy.

9th September, 1913. Passing a few drachms of urine.

11th September, 1913. Urine very scanty, only one ounce passed in the past twenty-four hours, but it is not red and is much clearer as regards albumen; weaker.

13th September, 1913. Urine increasing in amount but the general condition is worse. Extremities œdematous.

15th September, 1913. Urine increasing rapidly in amount and is quite clear, but he is worse in himself.

17th September, 1913. Urine passed 48 ounces in the past twenty-four hours, and there is only a trace of albumen present. Œdema increasing.

19th September, 1913. Very twitchy to-day, face and arms constantly working. Urine passed is over a hundred ounces in the past twenty-four hours. Bled a pint this morning. Very ill indeed.

20th September, 1913. Had several fits during yesterday afternoon and evening, and died at 5 p.m. from uræmia.

Temperature remained normal during his stay in hospital.

Locality.—Magadi is situated in a hilly and mountainous country intersected with sandy plains covered with scrub, waterless.

No other cases were noted as occurring in the locality.

The following biting insects have been recorded :—

Ochlerotatus quasiunivittatus, Theo.

Dorcaloemus woosnami, Aust.

Hæmatopota tumidicornis, Aust.

Hippobosca capensis, Olf.

Hippobosca maculata.

Hippobosca struthionis.

Liperosia minuta, Bezzi.

Liperosia, sp. nov.

Obfersia pilosa, Macq.

The case occurred after the rains.

JOHN L. GILKS,
Medical Officer.

Case 3.

Male, Indian. Admitted 3rd February, 1913, died 7th February, 1913.

I. *Locality.*

(a) Mombasa. Thick bush in parts. Mango trees. Mangrove swamps. Well cultivated in parts.

(b) No other cases had occurred in the same house.

(c) Insect fauna :—Mosquitoes—anopheline, culicine and stegomyia.

II. *Seasonal Variation.*

February, dry season.

III. *Personal History.*

(a) Not a regular quinine taker. Patient had suffered from malaria previously.

He stated that he had been suffering from fever for some three days previous to his admission to hospital. On admission his temperature was 100° and the urine of a port wine colour. He had very bad jaundice and his bowels were constipated. Pulse feeble and rapid. On 4th February, 1913, his temperature came down to 99°, but the general condition got worse, the urine retaining the same colour and diminishing in quantity, the patient having passed only about eight ounces during the day. Vomiting was a marked symptom, making it difficult to retain any food. On 5th February, 1913, the patient showed symptoms of collapse after having passed a very restless night. Urine evacuated got less in quantity but lighter in colour. Vomiting continued the same. On 6th February, 1913, there was no change in the symptoms and the patient continued in the same state. On 7th February, 1913, the patient died of cardiac failure.

(b) The deceased was an engineer on a Government launch which travels up and down the coast.

(c) No parasites were found in blood.

J. PUGH,
Medical Officer.

Case 4.

Male, Anglo-Indian. Admitted 25th February, 1913, discharged 10th March, 1913.

I. *Locality.*

(a) Mackinnon Road Railway Station. Scrub forest. No swamps in neighbourhood.

- (b) No other case had occurred in same house.
- (c) Insect fauna :—Mosquitoes (culex and anopheline) in wet season.

II. *Seasonal Variation.*

February, dry season.

III. *Personal History.*

- (a) Took quinine occasionally. Had suffered from malaria previously.
- (b) Patient works as a permanent-way inspector on the railway. This necessitates frequent journeys on the railway.
- (c) No parasites found in blood.

Admitted to hospital on the morning of 25th February, 1913, accompanied by the Sub-Assistant Surgeon from Voi.

On admission the temperature was 100°. The patient was badly jaundiced and the urine of a port wine colour. He stated that the urine had developed that colour a day previous to his admission to hospital, after taking quinine, grains 20, for a dose. The next day the temperature came down to normal and the urine assumed a lighter colour. The urine was analysed and found to contain albumen. Since the fall of the temperature the patient made an uninterrupted recovery, and was discharged as cured on 10th March, 1913.

J. PUGH,
Medical Officer.

Case 5.

Male, Indian. Admitted 4th June, 1913, discharged 13th June, 1913

I. *Locality.*

- (a) Mariakani. Station on the Uganda Railway. Forest. Swamps in neighbourhood in wet season.
- (b) No other case occurred in same house.
- (c) Insect fauna :—Mosquitoes (culex and anopheles) in wet season.

II. *Seasonal Variation.*

June, rainy season.

III. *Personal History.*

- (a) A regular quinine taker. Has had several attacks of malaria previously.
- (b) Patient is a fuel contractor for the railway. He spends most of his days in the forest cutting wood.
- (c) No parasites found in blood.

Admitted to hospital on 4th June, 1913, suffering from fever of three days' duration. The urine of a port wine colour. He was very badly jaundiced and the bowels constipated; the next day the bowels moved after an aperient and the urine became lighter in colour. Vomiting was a very troublesome symptom. The fever, which was 104° on the day of admission, came down to 99°. On the third day the fever came down to normal. All the symptoms showed signs of improvement, and after that the patient made an uninterrupted recovery. The patient was discharged on the 13th June, 1913, as cured.

J. PUGH,
Medical Officer.

Case 6.

Male, Indian. Admitted 22nd July, 1913, discharged 28th July, 1913.
This is the same patient as Case 5.

I. *Locality.*

Same as previous case.

II. *Seasonal Variation.*

July. End of rainy season.

III. *Personal History.*

- (a) Blackwater fever one day previous. Patient had been told to take 5 grains quinine daily when he left hospital after his previous attack. He was admitted for the second time to hospital with blackwater fever. He stated that he was suffering from fever for a week, and that he passed urine of a port wine colour since last night. The temperature on admission was 101.5° . Markedly jaundiced. Vomiting troublesome. Next day the temperature came down to normal and vomiting became less troublesome. Since then the temperature kept at normal, and the patient was discharged as cured on the 28th July, 1913.
- (b) Fuel contractor, Uganda Railway.
- (c) Parasites not found in blood.

J. PUGH,
Medical Officer.

Case 7.

Male, Indian. Admitted 18th August, 1913, died 25th August, 1913.

I. *Locality.*

- (a) Deceased had been residing at Kisumu in the Public Works Department landies. Lake shore, low scrub, swampy.
- (b) Other cases have occurred at Kisumu. Some years ago the disease was common.
- (c) Insect fauna :—Mosquitoes (anophelines and culicines), flies (hæmatopota and tabanidæ).

II. *Seasonal Variation.*

August. End of rainy season.

III. *Personal History.*

- (a) Not a regular quinine taker.
- (b) On his journey down from Kisumu he had an attack of fever between Lumbwa and Nakuru. At this spot it is very cold at night, and a chill, coupled with the sudden change of altitude, probably was the immediate cause of the attack.
- (c) No parasites found in blood.

On admission the temperature was 101° and vomiting was very troublesome. He passed a very small quantity of urine. On the 20th August, 1913, patient passed no urine. The temperature came down to 96° . On 22nd August, 1913, patient passed only one ounce of urine. On 23rd August, 1913, he passed no urine and hiccup was very troublesome. On 25th August, 1913, uræmic convulsions set in, and patient died from suppression of urine.

J. PUGH,
Medical Officer.

Case 8.

Male, Indian. Admitted 15th October, 1913, discharged 29th October, 1913.

I. *Locality.*

- (a) Kilindini. Congested district. Many mango trees; fairly well cleared of bush.
- (b) No other case has occurred in the same house, or in the immediate vicinity, as far as can be ascertained.
- (c) Insect fauna :—Mosquitoes (anopheles, culex and stegomyia). Bugs numerous in the majority of the houses.

II. *Seasonal Variation.*

October. Dry season.

III. *Personal History.*

(a) Not a regular quinine taker. Has had several attacks of malaria previously. Patient was admitted to hospital at 2 p.m. on the 15th October, 1913, and stated that he was passing urine of a port wine colour. On admission his temperature was $98\cdot8^{\circ}$ and bowels were constipated, very anæmic. The next day his temperature rose to $101\cdot5^{\circ}$ and the urine was of a port wine colour. On the third day the temperature again came down and the urine became lighter in colour. The patient was discharged as cured on the 29th October, 1913.

J. PUGH,
Medical Officer.

Case 9.

Female, aged 30 years.

Residence.—Railway brick quarters.

Station.—Kilindini.

Previous History.—She was suffering from malaria since a fortnight; she was not taking quinine regularly.

Present History.—On 21st March, 1913, at 10 a.m., suddenly she passed black urine, of which she was frightened, and informed me at 11 a.m., when her husband came from duty.

Temperature.—It rose to 102° in an hour's time and came down to 101° next morning; it gradually dropped down, and on the morning of the fourth day it was quite normal and never rose again.

Urine.—It was dark red on first visit, and after twenty-four hours' time it turned into red colour, and gradually turned into high colour and yellow in next twenty-four hours' time.

Jaundice.—There was slight jaundice.

Vomiting.—Remained only for twelve hours and stopped itself.

Liver and Spleen.—These were slightly tender and enlarged.

Kidneys.—Were painful and tender on both sides.

Treatment.—Medicinal.—Soda bicarb : and liq : hydrarg : perchlor. mixture was given thrice daily.

Dietetic.—Milk and soda-water and barley-water were given in frequent and big quantities.

External.—Liniment : terebinth : was rubbed over the kidneys and tr : iodine was painted over the liver and spleen.

HARKISHAN DAS,
Sub-Assistant Surgeon.

Case 10.

Female, aged 27.

Residence.—Railway quarters.

Station.—Kilindini.

Previous History.—She was suffering from chronic malaria since two months and having attacks now and then during the period. She was not taking quinine except a few times when she was suffering with severe attacks.

Present History.—On 27th September, 1913, at 8 a.m., when going round to see the cases in quarters, she reported me that she had passed black urine. On examination I came to know that it was a typical urine of blackwater fever.

She took 10 grains of quinine beforehand.

Temperature.—For first forty-eight hours it was between 102° and 103° , for next twenty-four hours it was between 100° and 102° , for next twenty-four hours it was between 99° and 101° , for next twenty-four hours it was between

98° and 100°. After next twenty-four hours evening temperature came down to normal. On seventh day there was no rise of temperature.

Urine.—It was black for first twenty-four hours and turned into dark red in next twenty-four hours; it was red for next twenty-four hours and turned into high colour for next twenty-four hours. On the fifth day the urine passed in its normal colour.

Jaundice.—There was slight jaundice, which subsided on the third day.

Vomiting.—It was troublesome first twelve hours, in next twelve hours she was keeping in milk and soda and not the barley-water. On third day it was totally checked by an application of a mustard plaster.

Delirium.—There was no delirium in the period of disease.

Liver and spleen.—Were enlarged and tender to touch.

Kidneys.—They were painful and tender to touch over both sides.

Treatment.—Medicinal.—Soda bicarb : and liq : hydrarg : perchlor mixture, was given three times a day.

Dietetic.—Milk and soda-water and barley-water were given in frequent and big quantities. Ice was given to check the vomiting.

External.—Mustard plaster was applied over the pit of stomach to check the vomit; kidneys were kept warm by means of liniment : camph : and cotton wool. Tr. iodine was painted over liver and spleen.

HARKISHAN DAS,
Sub-Assistant Surgeon.

Case 11.

A lay missionary, aged 40. Had suffered from frequent attacks of malaria. He had been in the habit of taking quinine irregularly.

Length of time in the country—six years.

He had been living at Mazeras many months.

This was his first attack of blackwater fever, which came on suddenly after a 10-grain dose of quinine.

He was admitted into hospital on the third day of illness. No telegram or message of any sort was sent to us to meet him or to make any arrangements for his reception. He was extremely jaundiced, and stated that he had been vomiting since the day before. The urine, though dark, was not the thick, porter colour which was said to have been the condition the previous day.

Pulse.—Weak, and inclined to be “thready.”

Blood.—No parasites found.

The next day the urine, in fair quantity, was much clearer, but vomiting persisted and hiccup developed, which was continuous until just before death the following day.

Treatment.—Hearsey's mixture. Absolute rest. Hot packing to the loins. Enemata. Transfusion. Injection of strychnine and one of morphia, gr. $\frac{1}{3}$, on the first day.

The fatal termination of this case, in spite of the clearing up of the urine and with no suppression, emphasises the danger of moving the patient.

On the third day of illness the man was carried to Mazeras Station, about a mile, and then shaken up in the train. On arrival at Mombasa he was put in a trolley in a sitting position and jolted off to the hospital.

C. L. CHEVALLIER,
Medical Officer.

Case 12.

SIR,

IN reply to your No. 28/750, I have the honour to give you the following particulars of a blackwater fever case treated by me at the Mombasa European Hospital in May, 1913 :—

1. The patient, aged 49, just previous to his attack had been living at the Government Farm, Mazeras, for about three weeks.
2. He then accompanied the Director of Agriculture in the direction of Port Reitz Creek, Mtwapa, Freretown, and Mtongwe. The weather was wet, and on one occasion he had to wade through water to the boat. The patient was then suffering from malaria, but did not lie up. Heavy doses of quinine—probably 25 to 35 grains per day—were taken for three days before the blackwater attack.
3. Mosquitoes had been troublesome at Mazeras, and at the hotel in Mombasa, where the attack came on.
4. The patient's first attack of malaria occurred in St. Vincent, West Indies, in 1890.
5. During the $10\frac{1}{4}$ years of the patient's residence in East Africa he has been treated for frequent attacks of malaria, both in and out of hospital.
6. The patient had an attack of ague unlike anything experienced before, prior to his attack of blackwater fever.
7. The patient was in the habit of taking quinine when he travelled in a malarious district.
8. I only saw the patient the night before his admission into hospital. I made an examination of his blood, but found no malaria parasites.

I have, &c.,

W. OWEN-PRITCHARD,
Senior Medical Officer.

The Principal Medical Officer,
Nairobi.

Case 13.

Private soldier, 3rd King's African Rifles, died of blackwater fever in Yonte hospital on 27th August, 1913.

*Locality.**(a) Physical features.*

The lines of Yonte, where the fatal case of blackwater fever occurred, stand on an elevated ground which is surrounded on one side by Juba River and on the other three sides by low lying ground. Consequently the site is well drained. The place cannot be called a swamp, bush, or forest area.

(b) No case of blackwater fever was recorded in 1911 and 1912.

(c) Insect fauna : not recorded at the time of the occurrence of the case nor immediately before or after it.

Seasonal Variation.

August is one of the months of great malarial activity.

*Personal History.**(a) Medical History.*

Nairobi.				
Venereal sores	...	...	...	10 days in 1910.
Venereal sores	...	...	...	29 " "
Ngabotok.				
Malaria	...	...	...	4 days in 1912.
Nairobi.				
Fever Int.	...	...	...	7 days in 1912.
Fever Int.	...	...	...	3 " "

The deceased was always given five grains of quinine twice a week.

(b) The deceased carried the letter post to Gobwen every other day in the evening, stayed there for the night and came back to Yonte next morning, for about three weeks previous to his being attacked with blackwater fever.

(c) Microscopic examination of blood not performed.

As no other case of blackwater fever is recorded during 1913, or the two previous years to it, Yonte cannot be marked on map as blackwater fever area.

IMAM BAKHSH,

Sub-Assistant Surgeon.

BLACKWATER FEVER IN JUBALAND.

The patient, a private in the 3rd King's African Rifles (Case 13), was admitted into hospital at Yonte on the 23rd August, 1913, with fever temperature 106, profuse perspiration, severe vomiting and jaundice. He passed three ounces of urine with blood first day, and he never passed any more of it during his illness of about five days.

I reached Yonte on an urgent call at 7 p.m. on 26th August, 1913, and found the deceased in a state of collapse and quite senseless, and he died at 6 p.m. on the 27th August, 1913.

The deceased had always been getting five grains of quinine twice a week for some months and had not been away from Yonte, but on post service to Gobwen by new road, which always keeps at a distance from the river.

History of blackwater fever in Jubaland up to the present :—

In 1902 the Medical Officer who relieved me at Yonte when I was posted to Camel Corps, 3rd King's African Rifles, had an attack of blackwater fever while at Yonte.

The next case was of an Indian fireman, s.s. "Rose," Government steam launch in Juba River. This man, after being twice successfully saved from the claws of blackwater fever at Gobwen, died of it in Yonte hospital, after six days' illness, on the 1st October, 1910. He was brought with the malady from lower Goshu, and Dr. T. F. Lumb, who treated the deceased, told me at Serenli that the most serious thing was the suppression of urine.

The third case is of a Goan tailor, 3rd King's African Rifles, Yonte.

This man suffered twice of blackwater fever at Yonte, though I cannot find any record in the admission and discharge book.

He was saved both times by intramuscular injection of quinine. This man's profession always kept him indoors, and he always spent his extra time sewing to make some more money.

The fourth—and to my knowledge the last—case in Jubaland was the private soldier (Case 13), who, as mentioned above, died of blackwater fever on account of collapse and suppression of urine on the 27th August, 1913.

From the above I conclude that Yonte is a blackwater fever area. I believe the deceased fireman of s.s. "Rose" always contracted disease near or above Yonte. It must be a disease of bush or dampness. The site of Yonte military lines and native quarters are free from blackwater fever, though always infected with malaria. I believe very strongly that some persons are predisposed to blackwater fever.

The Nandi private, 3rd King's African Rifles, on whose death from blackwater fever I am taking this opportunity of making this report, took enough quinine to keep him sufficiently safe from malaria, and so, I am certain, also did the deceased fireman of s.s. "Rose." I am certain prophylactic quinine could not insure them both against blackwater fever or death from it.

I have also seen a compounder of a mission hospital at Mombasa, who always took enough quinine to be safe from ordinary malaria, get blackwater fever at Mombasa, be treated at Mombasa Native Hospital, without help of quinine or any other anti-malarial drug, and be cured. This was about the end of January, 1913, while I was on my way to India on leave. On the evening of the last day of June, 1913, I met this man and he told me he was going to the Native Hospital, Mombasa, for the treatment of blackwater fever, from which he was suffering since that morning, notwithstanding his taking a lot of quinine almost every day. He asked me for some advice, and I readily told him to leave Mombasa as soon as he is cured this time and go to India or Nairobi.

The fireman of s.s. "Rose" and the Yonte tailor were twice saved by the injection of quinine, and then the fireman died under quinine injection treatment system.

To my knowledge of fifteen years of Jubaland I know of these four cases of blackwater fever only, against thousands of malaria in every station in Jubaland from Kismayu to Serenhi. Another point in this connection is that the natives of Jubaland do not seem to have any idea of this disease.

In short, it must be a very very rare form of malaria, if it may be so, and should be very very severe, or a small minority of men is specially predisposed to it, or the germ which produces it is rarely brought in contact with man. I believe blackwater fever is a disease of bush, long grass and dampness.

In conclusion, I beg to state my views upon the treatment of the disease, on which, I think, much difference of opinion exists.

I believe in the injections of quinine twice or thrice daily until the temperature is about normal. I cannot possibly understand why it should be contra-indicated. It cannot possibly be a food of any germ, though certainly a poison for many. Then it is a remarkable agent to keep the temperature down, to regulate the liver and to subdue malaria, which state must be present even taking it for granted that blackwater fever is a non-malarial disease, as we have always found cases of blackwater fever in the regions with malaria all round.

The second point, in my opinion, is of jaundice, which is also responsible for the presence of blood in urine or complete inaction of kidneys. To meet this a dose of white mixture every time after the patient vomits should be given until bowels move freely and frequently, and then 10 grains of sodium bicarbonate : in mixture in frequent doses until one drachm is kept in daily for three days. If this does not answer the purpose transfusion of saline mixture seems to me to be the only thing which should be practised on third day. Hot fomentations or dry cupping in the region of kidneys should not remain without trial.

If cured of one attack the subject of blackwater fever should never stay in the vicinity of the place where he had contracted the disease, and he should never go and stay near the place where any case of blackwater fever is ever found. A country of a very dry or cold climate should be the country of his living.

IMAM BAKHSH,
Sub-Assistant Surgeon.

Case 14.

Eldama Ravine.

Adult male, Indian.

Precious History.

Indefinite : patient had been living in Uganda, and had there had previous attacks (number and date not known) of blackwater fever. He had taken quinine at intervals (quantity unknown).

History of present illness.

The patient had come from Uganda, and on his safari came into Eldama Ravine.

At the onset of the attack the temperature rose to 104°, and reached 105° the same evening; there was much pain in the limbs and head, and the patient vomited bile.

On the first day the urine became pink, and soon turned to a dark brown.

There was some jaundice, and the spleen was enlarged. Recovery took place and the urine recovered its normal colour in a week.

Locality.

Eldama Ravine station is situated on a small eminence among the Mau Hills.

The station itself is fairly clear of vegetation, but there is cedar forest within a short distance.

The river is about 300 feet below the station.

There are no bad swamps in the vicinity.

Occurrence of a series of cases.

There have been no other in the district.

Season.

The case occurred in the dry season.

Microscopic examination of blood.

Not made.

Insect fauna.

Biting flies, culex, mosquitoes, &c.

WADHAWA KHAN,
Hospital Compounder

Case 15.

Male, engineer, aged 26, first time out in British East Africa; out 10 months. From Christmas, 1912, employed on waterworks in Shimba Hills working hard, and had frequent attacks of malaria, on recovering from which he resumed work immediately; frequently before he was fit to do so.

On 9th September went to bed with temperature 103° and vomiting. On 10th was jaundiced, sight affected—everything looking red—came into hospital.

On admission, jaundiced, collapsed, temperature 100°, pain over stomach and left side, spleen slightly enlarged, urine dark stout colour. Hæmoglobin found. Given Hearsy's mixture.

On 11th much better, urine not so dark. No parasites found in blood.

From this onward made an uninterrupted recovery. Had taken quinine in 10-grain doses for his malaria. Blackwater not attributed to quinine.

F. L. HENDERSON,
Medical Officer.

SIR,

Entomological Laboratory, Kabete, June 17th, 1914.

IN reply to yours of the 11th instant, I have pleasure in giving you the following records of biting insects in the places which you mention in your letter. I only mention below the places for which we have any records:—

Mombasa Island.—*Glossina austeni*; *Stegomyia fasciata*; *Culex tigripes*; *Banksinella luteolateralis*, Theo.; *Culex palidocephalus*, Theo.; *Glossina pallidipes*.

Rabai.—*Hæmatopota mactans*, Aust.; *Hæmatopota pertinens*, Aust.; *Pangonia comata*, Aust.

Mtwape.—*Ornithodoros moubata* (tick) recorded at "Mtwapa."

Shimba Hills.—*Hæmatopota mactans*, Aust.; *Ornithodoros moubata*; *Tabanus tæniola*, P. de B.; *Glossina pallidipes*.

Kisumu.—*Culex tigripes*; *Hæmatopota unicolor*, Ric.; *Anopheles (Pyretophorus) costalis*; *Tabanus africanus*, Gray.; *Banksinella luteolateralis*, Theo.; *Mansonioides africanus*, Theo.; *Anopheles mauritanus*, Grandpré.

Fort Hall.—*Hæmatopota* (near *distinctipennis*, Ric.); *Ornithodoros moubata*; *Anopheles (Pyretophorus) costalis*; *Tabanus denshami*, Aust.; *Tæniorhynchus fuscopennatus*, Theo.; *Stegomyia fasciata*; *Anopheles (Myzomyia) transvaalensis*, Theo.; *Auchmeromyia luteola*; *Banksinella luteolateralis*, Theo.; *Culex duttoni*; *Anopheles mauritanus*.

Nairobi.—For complete list of mosquitoes in the different Nairobi areas, see "Report of the Nairobi Sanitary Commission, 1913."

Also there are records of the occurrence of: *Hæmatopota hirta*; *H. tumidicornis*, Aust.; *H. unicolor*, Ric.; *Ornithodoros moubata*; *Uranotænia alba*, Theo.; *Stegomyia pseudonigeria*; *Ochlerotatus dentatus*, Theo.; *Chaoborus ceratopogenes*, Theo.

Eldama Ravine.—*Hippobosca maculata* (on horse).

I have, &c.,

ROLAND H. DEAKIN,
Assistant Entomologist.

The Principal Medical Officer,
Nairobi.



